

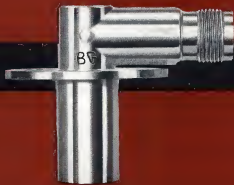
AVIATION WEEK

A MCGRAW-HILL PUBLICATION

NOV. 24, 1952

50 CENTS

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Domestic

Charles H. Babb, Los Angeles, aviation pioneer, who was president and chairman of the board of the Babb Co. Inc., aircraft and accessory dealer, died Nov. 13 of a coronary ailment.

The Turbo-Compound Super Constellation is now undergoing its intensive testing program, following its maiden flight lasting just over two hours. The test plane, a Navy version BUV-1, showed greatly improved acceleration and climb over earlier models.

Big Gen. Henry Black Chagitt, a pioneer of the early days of military aviation, died Nov. 14 in Walter Reed Hospital, Washington, D. C.

The Cleveland National Air Race Corp. has announced that its 1953 classic will be held at Van Nuys Municipal Airport, Dayton, and that its new title will be The National Aircraft Show and 50th Anniversary of Powered Flight Honoring the Wright Brothers.

Edward A. Schuch, who was chief engineer for the Aero Service Corp., and a pioneer in the art of aerial mapping, died recently at his home near Philadelphia.

"War" Holt, who was a dual-engine man for Air Associates, Cleveland, Calif., was killed recently when the engine of his plane failed after takeoff from Lusk Field, San Diego.

The Tennessee Valley Authority has purchased three helicopters, two of which already have been delivered, following successful use of a leased machine in petting transmission lines.

Donald E. Martin, Detroit executive, has been notified that his speed record flying a 145 hp Continental-powered Cessna "W" equipped with Elio-built wings has been accepted by Fédération Aéronautique Internationale as world record for Class C-2b airplanes over a 50-kilometer closed course. Martin's record speed, achieved on Aug. 15, was 125.95 mph for 100 km and 132.27 mph for 300 km. Previously, he was credited by FAI with an airspeed distance record of 946.48 mi for a Broncoville, Tex. to Houston, Tex., flight, June 12.

Civil Aeronautics Administration has organized a 10-man team to evaluate turbojet and turbo-prop transports with a view toward formulating safety and certification standards for these types.



F94C JACKET FOD mounted in loading cage of Lockheed F94C's wings (see photo p. 13) carries a dozen 2.75-in. missiles to implement the 24-the-plane mission in foreign area. Standardized nose of the pod is made of lightweight aluminum and drive tapes under impact of rocket guns upon target. Alternative use of the pod is to carry a machine gun and 365 rounds of ammunition. pod is 6.5 ft. long, gun pod 3 ft.

The team will be headed by George Hildebrand, chief of the CAA aircraft engineering division. A. M. Allen, engineering chief of Bureau 5 with headquarters in Los Angeles, will be vice chairman.

Donald A. Doff, executive vice president of Western Control Airlines, died at Minneapolis Nov. 14. A long-time member with about ten airlines since the early 1930s, he had been chief executive of Central during the Alcoa-Lunda reorganization last winter.

Civil aircraft production schedule for the second quarter 1953 will get full allocation of needed controlled materials if DPA accepts the recommendation of the Air Conditioning Committee. No Irish is anticipated. Total current program stretching to the first half of 1955 includes firm orders for 361 transports, 112 added since the previous quarter and a potential production of 11,942. Also cover planes for military, business and agricultural use.

Financial

Eastern Air Lines reported a net profit of \$1,773,871 during the first nine months of 1953 out of a gross of \$53,419,000.

Air France reports an increase of 26% in profits for the first eight months of this year compared to the same period last year.

British European Airways Corp. reports that although its revenue profit amounted to \$795,000 its relative income in the winter months is likely to show a deficit of about \$4,933,900 for its fiscal year.

Fairchild Engine and Airplane Corp. has a net of \$1,837,083 for the nine-month period ending Sept. 30. A 25-cent dividend was declared payable Dec. 22 to shareholders of record on Dec. 3.

Cross Aircraft Co. has declared a dividend of 20 cents a share payable Dec. 22 to shareholders of record Dec. 9. Cross announced adoption of policy of paying a regular (seasonal) dividend of 25 cents per share, to begin in 1953.

Subsidiary of Western Airlines, Inc., reports net earnings of \$801,335 for the nine-month period ending Sept. 30 from operating revenues of \$5,835,959.

Southwest Airlines Co. reports net income of \$51,630 for nine months ending Sept. 30.

Kaiser-Frazer Corp. and subsidiaries report net income of \$144,364 out of total sales of \$57,262,137 for the three months ending Sept. 30.

Minaco Manufacturing Co. had a net profit of \$523,639 for fiscal 1952. An additional 10-cent dividend per share of stock will be paid Dec. 15 to shareholders of record Dec. 1. Backlog was reported as amount of \$75 million.

Texas Aircraft Corp. reports net earnings of \$1,109,894 for the nine months ending Sept. 30, a 31% increase over corresponding period in 1952. Deferred orders amounted to \$215,000,000.

Northwest Airlines has paid its shareholders of \$515,330 on its bank issue, reducing the loan to \$7,935,365.

International

Quinta Engine Airways now is operating the longest commercial over-water route in the world on an air route from Sydney to Johannesburg, a 2,677 mi. fly between Mauritius Island and the Cocos Islands, using Lockheed Constellation.



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AVIATION CALENDAR

Nov. 24-25—Aircraft Industry Conference on Propulsion Testing, sponsored by General Motors Corp., 30 M. Hollingshead Corp. Inc., 1001 White House Hotel, Garden City, N. Y.

Nov. 30-Dec. 5—Annual meeting of ASME, Hotel Statler and McAlpin, New York, N. Y.

Dec. 1-4—Fourth annual Air Corps Day (ASME), Hotel Statler, New York, N. Y.

Dec. 2-5—Symposium on light metal heavy design and refinements for aircraft, SAE, 1801 E. 14th and ASME, Hotel Statler, New York.

Dec. 2-5—Aircraft Distribution and Maintenance Assn. 10th annual meeting, The Rensselaer Hotel, Miami Beach.

Dec. 15—American Rocket Society, Hotel McAlpin, New York, N. Y.

Dec. 18-19—Society for Experimental Stress Analysis, annual meeting, Hotel McAlpin, New York.

Dec. 3-5—American Management Assn., Hotel Statler, Cleveland, Ohio.

Dec. 4-6—Sixth annual Airframe Aviation Conference, Douglas, Arts.

Dec. 11-12—Second Convertible Aircraft Congress, The Franklin Institute, Philadelphia.

Dec. 17—Annual Wright Bros. dinner, 7:30 p.m., Statler Hotel, Washington, D. C. Wright Bros. Institute to be presented by 1453 p.m., N. Y. & Chamber of Commerce auditorium.

Jan. 22-26—Annual meeting and engineering display of Society of Automotive Engineers, Sheraton-Cadillac Hotel, Detroit.

Jan. 14-16—AEE 1958 NBS conference on High Frequency Measurements, Statler Hotel, Washington, D. C.

Jan. 19-25—Flight Maintenance Conference, Pullman Auditorium, Cleveland, O.

Jan. 19-25—Winter general meeting of the American Institute of Electrical Engineers, Hotel Statler, New York, N. Y.

May 25-27—National Production Forum of the SAE, Hotel Statler, Cleveland, O.

Mar. 11-Apr. 2-7—First International Symposium, Engineering, National Guard Armory, Washington, D. C.

Apr. 4-12—Second annual International Motor Sports Show, Grand Central Palace, New York, N. Y.

Apr. 20-21—Aeronautical Production Forum, National Aeronautics Meeting and Aircraft Engineering Display (SAE), Hotel Statler, New York, N. Y.

PICTURE CREDITS

1—Lockheed; 2—Cessna; 3—Boeing; 4—Boeing; 5—Boeing; 6—Boeing; 7—Boeing; 8—Boeing; 9—Boeing; 10—Boeing; 11—Boeing; 12—Boeing; 13—Boeing; 14—Boeing; 15—Boeing; 16—Boeing; 17—Boeing; 18—Boeing; 19—Boeing; 20—Boeing; 21—Boeing; 22—Boeing; 23—Boeing; 24—Boeing; 25—Boeing; 26—Boeing; 27—Boeing; 28—Boeing; 29—Boeing; 30—Boeing; 31—Boeing; 32—Boeing; 33—Boeing; 34—Boeing; 35—Boeing; 36—Boeing; 37—Boeing; 38—Boeing; 39—Boeing; 40—Boeing; 41—Boeing; 42—Boeing; 43—Boeing; 44—Boeing; 45—Boeing; 46—Boeing; 47—Boeing; 48—Boeing; 49—Boeing; 50—Boeing; 51—Boeing; 52—Boeing; 53—Boeing; 54—Boeing; 55—Boeing; 56—Boeing; 57—Boeing; 58—Boeing; 59—Boeing; 60—Boeing; 61—Boeing; 62—Boeing; 63—Boeing; 64—Boeing; 65—Boeing; 66—Boeing; 67—Boeing; 68—Boeing; 69—Boeing; 70—Boeing; 71—Boeing; 72—Boeing; 73—Boeing; 74—Boeing; 75—Boeing; 76—Boeing; 77—Boeing; 78—Boeing; 79—Boeing; 80—Boeing; 81—Boeing; 82—Boeing; 83—Boeing; 84—Boeing; 85—Boeing; 86—Boeing; 87—Boeing; 88—Boeing; 89—Boeing; 90—Boeing; 91—Boeing; 92—Boeing; 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1247—Boeing; 1248—Boeing; 1249—Boeing; 1250—Boeing; 1251—Boeing; 1252—Boeing; 1253—Boeing; 1254—Boeing; 1255—Boeing; 1256

INDUSTRY OBSERVER

►Pratt & Whitney commitments include delivery of a dozen Sikorsky S-55 jet passenger helicopters to the ground forces of NATO. Sikorsky has shipped one S-55 to the French SINKAS base.

►The new object airplane to be built for Navy by Glenn L. Martin Co. probably will carry the designation X-70A.

►Republic Aviation Inc. is developing a new supersonic fighter designated the XF-101. The XF-101 is also a Republic lighter model at eventual replacement of the Convair F-102 as the standard USAF supersonic interceptor.

►Initial order for the Boeing B-52 will be for RB65A photo-reconnaissance version. No bomber version of the B-52 have been scheduled for production before the end of 1955. Both the XB-52 and the YB-52, experimental prototypes, are combining their flight test programs at a good pace with an flight test work week. The YB-52 is now being instrumented for advanced flight test work while the XB-52 is scheduled to do high speed tests at Muroc Lake with an Air Research and Development Command crew.

►Air Force does not expect to get flight test prototypes of the Wright J65 jet-propulsion turbojet before the end of 1955. The J67 has been considered as powerplant for several supersonic fighter types scheduled for substantial production by the end of 1955.

►Chase Aircraft will roll out the first production version of the C-423 smooth transport at its Litchfield, N. J., factory in a few weeks. Main changes in the production model include a squared-off tail fin, larger passenger jump doors, and more powerful versions of the Pratt & Whitney R2500 engines developing 2,500 hp, for takeoff.

►General 183, which is scheduled to replace the model-engine 190-195 engine, is slated to be announced during the company's annual sales meet for distributors at Wichita, Kan., in January. The new 183 powered with an in-line engine, resembles the General 170 model but has a squared-off vertical tail. Also, the horizontal tail is adjustable about three inches trailing.

►American media experts question a recent British medical report that more than half the passengers in a Viking transport crash were injured as a result of "blow of the body over the seat belt." Cornell University Crash Injury Research center of 368 survivors in plane crashes showed that only 12 had one measure (usually breast) in the vicinity of seat belts. Casual analysis of the British accident data indicated that the fatal injuries occurred in the seat belt area and did not produce positive proof that any injuries were due to the belts. Stranger seat belts and shoulder harnesses have been developed and adopted in this country as a result of the Cornell research.

►De Havilland is planning a third Comet production line at its Chester plant if additional orders materialize at a sufficiently rapid pace. Some Comet parts already are being made at Chester. De Havilland is extremely sensitive to continued British and foreign criticism that its slow production rate is discouraging many new orders for the jet transport. De Havilland says its current Comet production pace is adequate to handle the volume of orders received to date.

►Douglas C-124A in service with MATS recently flew for 14 hr. and 36 min., while making a round trip of 5,263 nautical miles from Ranney AFB, Puerto Rico, to McChord AFB in Washington.

►British Overseas Airways Corp. is finding it using retractable jet inlet screens on its Comet jet transports. The screens would prevent the jet engines from sucking in pebbles, mud, rain and other extraneous material during ground run-up and taxi maneuvers.

WHO'S WHERE

In the Front Office

Stephen F. Kozlowski, former director of industry contracts for Minneapolis-Honeywell Regulator Co., has been named assistant to the vice president in charge of the Aero-nautical Division. Kozlowski has been chief with that company since he joined M-H in 1941.

L. J. (Larry) Hanson has been designated vice president-in-charge for Illinois Mfg. Co., Cleveland, Ohio, holder of quick-convert first line toolings. Hanson was President-elect Douglas D. Kamm's personal pilot 1951-1954. His former post as assistant general manager has been filled by Bert W. Manning, who is ex-USAAC pilot.

Frederick D. Goussard, president of General & Corp. New York instrument firm, has been elected chairman of the board of U. S. Airlines, certified flight center. Other new directors include Fred A. Miller, U. S. Airlines' new president, Col. Paul D. Stronach, Col. G. Gordon Mason, Jay W. Kunkel and Elmer B. Phipps.

Changes

►H. Allen has been designated chief in place of the USAF senior press program for Lockheed Constellation Co., N. Y. T.

►Harold Bittelsdorf has been named general manager of Liberty Mfg. Co., Santa Monica, Calif., manufacturer to aircraft firms. James A. Kraft, Jr., has been appointed sales manager.

►Rex Acheson, C. B. Todd, TSN (Tex.), has been named manager of Continental Co. Co. of California, Kinn plant making Boeing B-47 and Grumman S2F3 assemblies.

►Rex B. Pack has been appointed in chief sales manager at Pratt Products division of Pratt & Whitney Corp., Cleveland.

►Dr. George Gerschlager, former principal research engineer in Republic Aviation Corp., has joined Eastern Industries Corp., N. Y., as a consultant to advise on government projects. The firm handles plastic molding and fabrication.

►S. D. Berke and Russell Strangman have been appointed Middle West and Eastern Railroad regional managers, respectively, for General Constellation Co., Los Angeles.

►E. W. Wilkins has been designated manager of Wright Aeronautical division's spare parts division, Wood-Ridge, N. J. E. E. Brown has been named assistant service manager of the firm.

Honors and Elections

Dr. Geoffrey de Havilland, founder and director of the de Havilland Aircraft Co., Ltd., has been chosen recipient of the Guggenheim Medal for 1952 in recognition of his 10-year term of personal and industry and commercial aircraft and the development of long-range jet transport. Phil C. Gault, managing director of DAI Canada, has been awarded the McKee Trophy, given annually to the person who has done most toward furthering Canadian aviation during the past year. Gault received the trophy for his development of the DAI Beaver and Otter.



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CONVAIR

Washington Roundup

Defense Program: Overhaul

First action of incoming President Dwight Eisenhower on defense, it is expected, will be to appoint a commission of civilians to scrutinize all aspects of the military program and come forth with recommendations aimed at reducing "adequate" costs for maximum cost.

It is likely to touch off the bitterest inter-service rivalry since Vietnam. It also means that the services face an uphill struggle not just against losing authority to the Secretary of Defense's office.

The service commission was first formally proposed by Sen. Robert Taft as his answer for the convention.

The proposal was included in the Republican Party platform: "We shall revive our entire peripatetic population and we shall stop it from a state of waste, lack of coordination, inertia, and conflict between the cities."

One probable effect of establishment of the review commissions: Any major change in the defense program by the new administration will not be referred until after the 1955 fiscal year budget. This will reach Congress in June or July 1954, and will be for the year starting July 1954.

Sen. Styles Bridges, key Republican in Congress who can have his choice of the Senate leadership post, chairman of the Armed Services Committee, or chairman of the Appropriations Committee, estimates it will take the commission about six months to complete its work.

Congress: Little Change?

Earlier changes in the membership of the House and Senate aren't likely to affect the final outcome on any particular issue.

There will be 20 more Republicans and 29 fewer Democrats in the House and not more Republicans and one less Democrat in the Senate next year. There also will be some replacements not reflected in the party lineup, such as replacement of Rep. Lindsey Borenwell, who headed House Interstate and Foreign Commerce Committee's Arabian Subcommittee this year, by Rep.-elect David Bonior.

But notes this year on vital statistics mean won't it close that the outcome would be affected by these moderate changes. For example:

- The House vote in favor of dumping a ceiling on defense spending—which would cause a slowdown in plane deliveries—was 229 to 190.
- The Senate vote for instant mail pay for foreign postal workers was 53 to 23.
- The Senate vote against making embassies immune from lawsuits was 51 to 28.
- The Senate vote against cutting back Air Force research and development money was 47 to 50, and against slashing USAF military funds, 49 to 25.

Subsidy Legislation

Changes in the makeup of House and Senate Interstate and Foreign Commerce Committees seem to favor the coalbeds in their fight against federal subsidy conversion legislation for the oilbedded industries.

- **Four of the 13 members** who went along with the legislation forced by the scheduled industry won't be back next year: Rep. Lindsey Borchers, Rep. John McInnes, Rep. Leonard Hall, Rep. Thomas Deane.

- *All eight of the committee members who backed the majority and supported legislation authorizing a rapid mail pay formula and opening the robbery field to the reformed gangster, will be back—Rep. Charles Welford, a chairman; Rep. Arthur Kline, Rep. William Groahar, Rep. Louis Hoff; Rep. Mingo Minkler; Rep. John Heston; Rep. John Williams, Rep. Homer Thornberry.

- Among the re-elected congressmen Rep. Peter Mack, who visited a herbicide spread the week a year ago.

- The makeup next year will be greatly changed. There

- All five of those seats had been filled by members who supported the scheduled senior position on normal school graduation legislation: Sen. Ernest McFarland; Sen. Herbert O'Connor; Sen. Owen Rowland; Sen. James Kern; and the late Sen. Bruce McInnes.

Airline Attorneys

Scheduled airlines and woodlands are financing some legal heavyweights—some with political and some with CAB ties—in the Board's investigation to determine the future of competition in the industry.

Representing the airlines will be
Harold Massey, former CAB counsel, representing
North American Airlines.

Morris, Knudsen and Han, representing American Air Transport, Inc., and Air Coach Transport Assn. Senior member George Morris formerly was president of the American Bar Assn and prior member Albert Bittel, a former CAB examiner.

Whitaker and Wheeler, representing Coastal Cargo, Inc., is the firm of James S. Whitaker, former chairman of the Senate Interstate Commerce Committee.

Dumas, Richberg, Tydings, Beebe and Lunds, representing Freight Air, Inc., and Seaboard & Western Airlines, include several key figures of the Roosevelt era: former ambassador in Russia, Joseph Dumas; Donald Richberg, former head of the National Recovery Administration and assistant to former Attorney General Homer Cummings; Arthur D. Cordes, former attorney for the Bureau of National Revenue and Maritime Commission; James S. McMill Tolson.

Fuzess, Borge, Fox, and Asch, representing World Airways, includes Wendell Borge, former Assistant Attorney General, and Albert Asch, former assistant to Attorney General Francis Biddle.

Opposing the standards will be
Pogue and Neal, representing Western Airlines and
Alaska Airlines, including L. Welch Pogue, former CAB
chairman, and George Neal, former CAB counsel.

Gladdes, Fahn, Waterline, Wolfe and Rosky, representing Team Work Airlines, includes Gerald Rosky, president Democrat appointed to represent the government as a director of General Aviation and Flight Corp. which leases TWA President Jack Frye's plane.

Edward Leamer, representing Continental Airlines and Northwest Airlines, former CAB chief examiner.

—Katherine Johnson

New Cutbacks Hit Aircraft Programs

- Slashes follow line set by Campbell Report.
- Funds to go to newer plane, engine types.

By Robert Hunt

Drastic cuts in production of obsolescing military aircraft types were made last week by the Air Force and Navy as a result of planning by Defense Secretary Robert Lovett. Procurement funds stemmed from the cuts will be used to increase production of new types.

• **Northrop-Gulfair** cut the following programs:

• **Northrop Scorpion** (F-80) two jet night fighter. All current models of the Scorpion (A, B and C) have been grounded since September after a series of crashes indicating structural deficiencies. First F-80s were scheduled to be delivered in November with a production program as this model stretching to the end of 1955. This program has been virtually eliminated by USAF. Presently the development program for the F-89, successor to the F-80, had been cancelled by USAF.

• **Lockheed Staffer** (F-94) all weather interceptor. This new equipped, rocket-fueled fighter is already in production. See the production program previously had been reduced by USAF and cut bases were the outbreak of the Korean war.

For the Navy the Bureau of Aeronautics made the following cuts:

• **Grumman Cougar** (F7F-4 and -7) two-engine carrier-based jet fighter. Navy had originally planned a heavy production program for this fighter involving more than 1,000 planes during the next two years. Shut in this program was heavy.

• **Douglas Skyraider** (AD), post-atomic attack plane. The Skyraider has been the Navy's standard post-atomic carrier-based attack plane and gained an excellent reputation in Korea combat. It is scheduled to be replaced by turbo-prop-powered AJD.

• **North American Sabre** (F-86) carrier-based attack plane powered by two piston engines and one turbojet. The Sabre is the largest U.S. carrier-based bomber and Navy's first plane equipped to carry atomic bombs. Navy recently announced that it planned to convert

Air Force Production Figures

In a detailed report concerning all phases of the USAF procurement picture, Secretary Thomas H. Dillman wrote:

"Aircraft accepted by the Air Force in August totaled 51 million 11 million, compared to only 11 million in August 1951. Specifically, total fighter production in July 1952 was about five times the amount of two years ago, weight of fighter programs was up 10 times higher in 1952 than in 1950. Bomber production in July 1952 was five times higher than in 1950 and in terms of weight seven times higher. Bomber production schedule, applicable during 1951, 91% of the quantity of material called for was delivered. During the first six months of 1951, 90% of the applicable production schedule was met.

Two years ago production of the B-47 bomber program had barely started. Today at Boeing Wichita, one of the three plants dedicated to this program, B-47s are being turned out at the rate of better than one per working day. In the fighter category, two years ago the entire month's output of F-86s and F-84s—two types fighter programs—was 15, or less than one a day. The combined output is now running around 210 a month, or better than 15 per day.

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The Defense Department is extremely anxious to present a well-coordinated picture of the present needs and aircraft procurement policies and programs to the 83rd Congress. Even without the impact of economic matters, Republicans reacted, there was a growing congressional disinterest with the military procurement picture as it developed after the Korean war.

• **Radford** (F-84) day fighter. At the time that the Defense Department was quietly implementing some of the principal recommendations of the Campbell Report, Secretary Lovett was already dealing with defense procurement problems against the sharp criticism of the Senate Armed Forces Subcommittee on Preparedness headed by Sen. Lyndon Johnson. Marking the situation from the Joint Chiefs of Staff, Marshall Board and the Secretaries of the Army, Navy and Air Force, Lovett made the following points in rebuttal to the most acute report of the Johnson Subcommittee (November Week Sept. 4, p. 1).

"The standard is military aircraft production is not made entirely by final demand, but also on the constant on program that might have followed from a change in demand."

"In meeting production schedules and stretching them out over a longer period of time, immediate requirements for



LOCKHEED P-80 STARFIRE, rocket-fueled interceptor (note auxiliary engine pods protruding from wings) is one of planes being cut back under new USAF plans.

critically short production equipment, materials and manpower were reduced," the Manhattan Board stated. "And to that extent military demands have not created serious disruption in the economy of the nation which might have taken place otherwise. If military production were pushed up to a level where its 'take' of base materials reduced the operations of many small and medium-sized business enterprises beyond their break-even point, the damage to our economic structure would have been severe with comparatively little gained in the way of additional weapons."

• **No greater military aircraft** could be made than to force aircraft design at this time.

• **Appointments** of a defense production unit in member states is desirable. Lovett noted that he had appointed Hugh Dens, a vice president of General Motors Corp. in charge of manufacturing, as a full-time production coordinator.

• **The standard** of aircraft production will not delay deliveries of aircraft to the armed forces.

ington officials under the USAF program because the original production schedule for the program was reduced. The standard applied only in production for the U.S. armed forces.

• **The Joint Chiefs of Staff** have never stated that the years 1953 and 1954 will constitute the period of our greatest need, as quoted by the Senate report. Lovett and the JCS mentioned the post-war period of 1954 as the date by which Russian capabilities will become "very dangerous." They do not estimate that Russian intention is to make war in 1954, or imply that they are dangerous to be less.

Aviation Safety Grant

Lawrence S. Rockefeller has made a grant of \$13,600 to the Flight Safety Foundation to be used in support of a program of safety promotion and education. The foundation is dedicated to the advancement of safety in all branches of commercial and private flying.

British Also Order Cutbacks

Britain's current economy drive in the defense budget already has forced a cutback in the production of obsolescing aircraft types, similar to the recent action by USAF and Navy.

However, it is the British jet Caravan bomber program. Originally the program called for production of three other types in addition to the de Havilland, English Electric. The subcommittee programs have been generally reduced and there is a strong possibility they may be cancelled completely.

In the night fighter field, where

the Gloster Javelin will take over, current orders for the de Havilland Venom and the Armstrong Whitworth NF11 have been cut back.

Most critical effect of the economy budget may be on the new generation of high-speed bombers on which the Royal Air Force is counting for its ultimate power three years hence. Indications are that only three orders rather than six by production will be authorized for the Vickers Valiant, Avro Vulcan and the Handley Page HP.85, current winged bomber now paid for by four separate jets.

Odlum Suggests B-60 Jet Airliner

Consolidated Verters B-40, excepting jet-powered version of the B-56, could be available as a commercial jet transport in 1955, and it could carry 280 passengers coast-to-coast in five hours, according to Odlum's chairman of the board, David B. Odlum.

Present is that the military release manufacturing space and personnel to allow Odlum enough "allowance" to undertake the task with sufficient facilities and manpower.

Other items of interest noted by Odlum in a speech before the Wings Club this month:

• **Planes** capable of speeds up to Mach 7 as already under construction.

• **No airline** should use competitors to face an overseas manufacturer to build a line.

• **The 2% fee** now received by defense manufacturers does not allow enough "allowance" to cover a large backlog.

• **Cost and production** rates of planes must be reduced. They are too high, require too many and too high private prices. We need new technology to replace planes currently, especially military aircraft where the economy is low. Possible greater use of plastics might be the answer, Odlum suggested.

Quick Trans-Arctic Route Hearing Urged

State Department is urging Civil Aeronautics Administration to expedite hearing of the Camp-West Coast Trans-Arctic route application of Swedish Airline Svenska. Since old CAB consideration is due 31.

U.S. current hold CAB that if SAS flies the route they want to do the same. That, if the Board is not ready for U.S. operation at the route, the airline ask that SAS not be allowed to operate it. The American, TWA, Western and our other airlines promised their views to CAB at an informal conference. The Board has not discussed the matter with our SAS authorities, but may by Dec. 31 or early next year.

The CAB members have not yet stated the pros and cons. Key problem is that if the Board allows SAS to start scheduled, West Coast Europe service about in SAS, then U.S. prestige considerations may dictate that a U.S. line operate the route, too. And the route may be that would be high. Present traffic demand for such service is considered low. (Aviation Week Oct. 6, p. 1).

The director of State Department's Transport and Communications Office.



ANGLED DECK on USS Forrestal will permit emergency landings after bad landings.

New Angle for Carrier Landings

A new type of flight deck and open tail technique has been developed jointly by the U.S. and British navies to increase efficiency and safety of jet aircraft operations aboard nuclear carriers.

The new deck has no additional area extending seaward from the normal flight deck to allow the aircraft landing area to be angled two degrees off the ship's centerline.

► **Operation**—How it works: In current carrier operations the pilot approaches for a landing at about 5 to 11 knots above stalling speed. When he is directly over the landing area he gets a signal from the landing signal officer to "cut." The pilot drops his flaps and slows down until he is where his tailhook catches one of the arresting wires. When the pilot drops his flaps he is already in a steep climb and the arresting gear he is already in a steep climb and the arresting gear he is already in a steep climb.

For a piston-powered plane, the crash barrier can catch the plane. For a jet, a 12-ft. wire web lines to catch and hold the landing gear and wing. If the barrier fails to hold a plane, or it bounces over, a crash net at the end of the deck catches the plane and pulls it forward.

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In the new technique the jet pilot approaches at an angle with his no brakes extended and pulling about 75% power. He comes in at a relatively high speed with the nose high to make the aircraft sink at a controlled rate of descent instead of stalling, down onto the arresting gear, he "sinks" into it and doesn't cut power until he feels his tailhook engage. If the hook fails to engage, he remains in the air, pulls the throttle forward and, once he is already in considerable power, the jet

plains off. No fuel, using jet aircraft on a specially modified perimeter at the carrier FOD's flight deck.

Initial construction of an angled deck on a carrier is now being completed on the 7,000-ton Forthright carrier of the fleet. A full-scale test evolution of the angled deck and its flight techniques is scheduled for early in 1957, with both British and American jet types participating. Cost of the American modification is about \$1 million. If the American tests are as successful as anticipated, all of the Essex-class carriers will be modified with an angled deck. On carriers with an angled superstructure, the angled deck will extend off the port side. On the new flush deck, 60,000-ton Forrestal-class carrier the landing and catapult areas can be angled in both directions.

Transistor 'Aging' Troubles Producers

Can accurate test enough to take off again and cause source for another approach.

The construction of the angled deck and new approach technique offers the following main advantages, according to Rear Adm. T. S. Goss, chief of the Navy's Bureau of Aeronautics.

► **Safety**—In conventional landings of a crash into the forward division of girded and angled planes. A recent crash of the type where a B-57 crashed the tailhook crash barrier on the Essex off Essex killed ten men, injured a man and destroyed about \$1 million in aircraft. If a crash does occur on the angled deck, it is pointed away from the deck land and "safety" superstructure, it will involve only a single plane.

Additional benefit from charged wing gear, nose landing and "wing" bombs that fire or explode along the line of landing will also be derived from new flight deck concept and valuable targets. The jet pilot also has a much better chance of making a recovery from a bad approach or malfunctioning tailhook, than formerly.

► **Economy**—The angled deck landing gear requires only half the arresting gear used for normal operations and eliminates the crash barrier. Observers estimate that about \$300,000 will be saved on arresting gear engines alone. Considerable weight is saved in the critical nose high above the plane's center of gravity. Indications are that enough weight can be saved to allow installation of an additional catapult for emergency use on the angled deck.

► **Developed by British**—The angled deck concept was developed by the British at the end of World War II when they began operating two-engine attack planes of wooden construction. The second crash barrier rose up three planes beyond runway. First flight tests were made in 1951 by U.S. Navy

composers, GLE has experienced a phenomenon similar to stability aging which has been traced to a lack of adequate protection against corrosion at the contact between the wire and the ground. Laboratory tests have indicated that corrosion does not indicate (Photo) effects.

"New commercial designs having adequate moisture protection are under way in the present time."

A recent at Western Electric and that approximately 15% of its type 16V8 transistors have shown significant gain changes in storage. (Western Electric is possibly the largest transistor manufacturer at present) and an affiliate of Bell Telephone Labs which invented the transistor).

The company has as yet declined to talk publicly about the problem or corrective measures which might be instituted.

► **Future Still Bright**—Present corrosion problems are typical of those involved in carrying any new device from the laboratory into production and are not expected to dampen industry enthusiasm for the transistor. New Jersey Bell Telephone Co. showed its much desired but costly by manufacturing more use of transistor in its automatic, constant long-distance dialing service at Englewood, N. J. to the new special example.

Turboprops

• NACA and services seek better plane designs.

• Mach 1.5 speeds possible with present know-how.

U.S. high-speed turboprop development, which has been lagging for about 10 years, is now being stepped up in the last two years, one due for a test in the near future.

Although the development has been lagging for some time to make progress, that will carry aircraft up to speeds of Mach 1.5, without parts has been done until recently about developing the high thrust turboprop, powerplants or airplanes specially designed to fit them.

Two new steps toward pulling the turboprop out of the doldrums are now in progress.

► **National Advisory Committee**—for Aeronautics has been asked by U.S. military authorities to make a detailed study of design parameters for an ideal configuration for a high-speed turboprop engine.

► **Air Force** and Navy recently united their agencies about the size of the

turboprop engine development in favor of more powerful engines which will produce 5,000 hp. have achieved development of such a powerplant.

► **Accept Turboprop**—Delays in developing more powerful turboprops that would be competitive in power with current turbojet engines has been responsible for the slow start for jet propeller-driven planes. U.S. military development has been concentrated on turboprops that little attention has been given to turboprop engines since five years. Navy development centers on the Allison T38 and T40 and the Pratt & Whitney T34 about five years ago.

As a result, aircraft manufacturers are not designing high-speed propeller planes and are accepting positions in the relatively low power (about 5,000 hp.) of the two U.S. turboprop now in advanced development or limited production—the Allison T38 and Pratt & Whitney T34.

U.S. propeller engineers feel that data is available today to design propellers of propelling planes at speeds as high as Mach 1.5. This would be competitive in speed with the fastest jet planes now flying, while providing additional fuel economy, better takeoff and climb performance and reverse thrust for shorter runway landings.

► **Conventions Planned**—The first joint



NEW SWEDISH ATTACK PLANE TESTED

Flight tests were started Nov. 3 of the new Saab 21. Later, a 700-hp two-engine attack plane designed primarily to attack ground and sea targets. Plans on status and the powerful Kallitruer arm engine. The plane's chief test on further development.

tested in its design wing wings and tail and the large wing at the horizontal tailplane for ascending or flying at the root of the movable stabilizer. The two wings are fitted with large Fowler-type flaps and leading edge slots and slats and elevators

are hydraulic boost. Crew members have separate seats. Flapless movement of the plane consists of control, but rockets and bombs also can be carried at the end nose. Nose wheel is retractable and steerable. Nose wheel is retractable and steerable.

at which jet engines have stepped up their power and the military emphasis on speed, probably are primary reasons why more attention has been paid to further turboprop developments in the last two years.

Two high speed jet planes have been proposed for conversion to turboprops to test the propeller drive at speeds in the subsonic and transonic ranges. One of these proposals, for modification of the McDonnell NF-45 jet propeller-driven in addition to its jet powerplants, has since been dropped. The other still has great Air Force and Navy support for the installation of a turboprop in a revised operating version of the Republic F-94.

Turbulence created in the nose of either of these fighters by the wake of a high-speed propeller would subject the plane to noticeable rough air conditions it would not fly in as a jet jet.

A third proposed turboprop development of relatively high subsonic speeds calls for installation of turboprop engines in a long-range version of the Boeing steep D-17 sweeping midline bomber.

• **Return to MiG-convertible**—Propeller engines meet with that installation of turboprop engines in midline under the wings, as would be indicated here, in far from an ideal arrangement. It involves either a severe loading device on propeller shafts for ground clearance or a ridiculously long-legged and awkward landing gear.

Return to something like the Douglas XB-42 MiG-convertible configuration, with the propeller at the tail as the plane will not have to fly through propeller turbulence, probably is indicated at least not preferred configuration.

While several other turboprop-driven planes are now being made it is the high-speed capabilities which today's propeller driven engines make possible.

Design trends for very thin straight blades, whirled at high speeds, continue to be favored in the test vehicles, according to leading propeller designers. Additional test have indicated that the prop does not need to be so thin as the official data says the disk and hole is as was earlier believed.

Bell Copters Abroad

Foreign governments now using, or planning to use the Bell 47D-1 helicopter in military as well as in some civilian roles include: Norway, Sweden, Denmark, Italy, Chile, Belgium, France, Chinese Nationalists, Philippines, Iraq, Argentina and Canada. In addition to military assignments, the copters are used in postal routes, ambulance duty, pest control, power line patrol, crop survey and exploration.

Fifty Years of Powered Flight

Plans for a year-long observance of the 50th anniversary of the Wright Brothers' first flight was revealed in Washington last week by James Harold (Jimmy) Doolittle, who will head the program. The 50th anniversary of flight observance will begin Dec. 17 at the Wright Memorial dinner in Washington and continue until the same event in 1933.

Doolittle, who will receive the 1932 Wright Brothers Memorial Trophy for his contributions to civil aviation (Aviation Week Nov. 17 p. 12), will head a committee of approximately 100 leaders in all phases of aviation to guide the program. Committee headquarters will be in Room 653, Smithsonian Bldg., Washington, D. C.

Goal of the committee is to organize a national tribute to the pioneering achievements of the

Wright Brothers, Coville and Voss, who made the world's first flight in a powered aircraft at Kitty Hawk, N. C., on Dec. 17, 1903. The program also will recognize contributions of other aviation pioneers and attempt to stir public appreciation of aviation's contribution to America during the past half century.

The 1932 National Air Races scheduled to be held at Dayton, Ohio, home of the Wright Brothers, and other outstanding aviation events are expected to be coordinated with the 50th anniversary program. Doolittle is open to all American citizens to furnish additional ideas for the celebration to him and his committee. These suggestions should be addressed to Doolittle either at the Sherman Building or at the Air Force office in the Pentagon.

ster concerned with military affairs.

The gist of the Air Force statement appears to be that K.F. has had an experience in the aircraft industry and does not necessarily require large initial costs. Bridges declared "This explanation may be considered a strong argument against the contract rather than any justification for continuing it. I believe most people would agree with me that it is the duty of the Air Force to procure aircraft to see that contracts are let to firms with know-how to build them properly and at the best price to the government."

Bridges said that the K.F. contract for production of C-119s also should be investigated "to see if it created the same excessive costs. I am so used to believing any contractor while established plane builders have caused capacity."

• **Probe Outbreak**—Pentagon State investigations should go into Bridges' statement. Whether the Fairchild plant at Hagerstown, Md., can produce the bulk of the K.F. contract the K.F. would as meeting production quotas, whether it is possible for that cost to be lowered under the K.F. contract—whether Air Force has increased excessive costs on other several sources of supply for aircraft production, whether USAF's military command concerned with the civilian contract is letting the K.F. contract.

Jet Overhaul Base

A jet aircraft overhaul base has been dedicated at O'Hare International Airport, Chicago, by Lockheed Aircraft Service.

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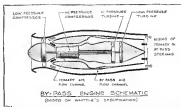
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By-Pass Engine Promises Fuel Economy

- This powerplant looks good for transport types.
- It offers low-cost high thrust for climb, cruise.



Power Jets Ltd., the government-owned company entrusted to supervise British jet development and the application of Whittle and other patents, started work in 1945 on the L41, an adaptable by-pass unit. This engine, well under construction in 1946, was dropped when, under pressure from the British engine industry, Power Jets stopped active design work in favor of other efforts.

Recently, the French Société Verbeaux has built three jet small by-pass engine, the Argus, with considerable success and with remarkably low fuel consumption.

It has been said that the British Meteor V4 engine with ducted fan thrust augmenters showed promise at the size of the engine driven by an entirely independent turbine mounted downstream of the main turbine—yet a by-pass design, but British points out that it was not. The point at issue is that in this case the air mass accelerated by the fan is independent of that consumed by the compressor, and that it is quickly lost to the tail pipe than can be a byproduct of a compressor or supply.

Rebuttal Theory—The by-pass principle is simple enough and depends upon the fundamental fact that the more the jet stream velocity is to the speed of the aircraft, the greater is the propulsive efficiency. Until it is traveling very fast, the straight turbojet is not efficient because of this "slip." In order to give high takeoff thrust—that is to get a large mass of air moving—the turbojet has to accelerate it to a very high speed. This means burning a great deal of fuel—over a pound for each

hundred pounds of thrust, in fact. (In comparison, the propeller of a piston engine can deal with something like one hundred times as much air for each pound of fuel burned.) Usually, fuel consumption of around 0.5 lb./lb.-hr. are contemplated for the by-pass engine, which means very high fuel mileage in the atmosphere.

The turbo-prop engine is a way of improving the air mass flow, but it adds all the complications and weight of a high reduction gear box and a propeller. There are also the attendant difficulties of starting, and the provision of special synchro pistons and accessories interfering in the propeller controls. The airplane itself is affected because of nacelle "disturbance" and dispersion drag and, of course, there is the longer (and heavier) takeoff run needed for propeller ground clearance.

Better Compromise—The by-pass engine, and the ducted fan, are attempts to get the best from both serious British authorities who believe in the by-pass principle alone find it is considerably simpler than the large turbo-prop and is lighter and more reliable. It is possible to achieve five to ten times the air mass flow of a straight jet for the same fuel consumption.

The reason for this is that the first stage or low pressure compressor stages can give a pressure ratio of 1.5 to the flow from this in the next stage. The same quantity, probably 40%, comes through the high pressure stage, with a ratio of, say, 4:1 giving an overall pressure ratio of 6:1 (4 x 1.5). Meanwhile, the by-pass air receives much less

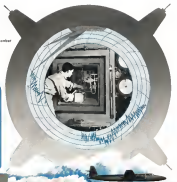
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In 1938, a Franklin-powered Sikorsky R-52 helicopter established a new world's altitude record of 21,309 ft., and a new world's speed record of 129.808 mph. These records still stand unsurpassed.



AIRCRAFT MOTORS, INC. SYRACUSE, N. Y.

from the engine body and in the process absorbs heat energy, which being discharged at the rear of the engine.

Furthermore, the by-pass jet is moving much more slowly than a normal jet and, mixed with the exhaust gas jet, has much better propulsive power at low speed because of the retention of slip. Above all, the by-pass is a natural fire extinguishing device because in Whittle's original patent—because of the large quantity of exhaust air remaining.

► **Application**—British experts, naturally sceptical by Lord Rye because of their work in the Conquest, at first the by-pass engine is ideal for bomber and transport operations in aircraft such as the Valiant in the Conquest IV. High thrust for takeoff and climb are available, with or without afterburning, and the improvement in noise level is particularly valuable for cruise economy at 50,000 feet and above.

Inter-leaf clearance of the by-pass engine is its factor for high-speed cruising, and there is no reason why over-all clearance should necessarily be any larger than for an equivalent straight jet. The cooling duct of a jet may well reduce structural problems when designing the engine because of heat transfer from high-velocity jets.

The first low-pressure compressor stages can be driven either by gas or by using a turbo-prop layout, the latter probably being the simpler. In the Verbena engine, variable incidence entry guide vanes are used to reduce the total resistance without too great speeds. This feature is presented in a video by Dr. Joseph Strydom, but is seen probably a minority.

Although small, the Agen is an excellent example of a by-pass engine and deserves full credit in being the first to achieve flight. Tests were made in a Fugro Generalized light aircraft.

► **Objections**—Objections against the by-pass engine expressed by technicians of most engine British companies may be summarized as follows:

• **Operating backward** are not ideal. The by-pass engine is a more refined design (problem, depends more on ambient conditions, then does the straight turbo jet). New conditions or changes in specifications, demand a complete redesign.

• **Drive mechanism** is complex. The two-shaft layout is already had enough to work with, say the British design team.

• **Ducting installation** is complicated. It involves splitting an air supply through areas already alive with fuel, pipes and other plumbing.

• **Mixing of jet stream** is tricky. Interference and noise problems of such in situations are not completely known, let alone studied.

► **Rebuttal**—Proponents of the system



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counter that technologically there is the knowledge to overcome all difficulties, it is merely a matter of experimenting to use the best methods. They assure their engineers of something like this.

Finally, there is the question of operating speed. The layout is not a pure speed engine and is essentially suited to a lighter-weight vehicle long range or endurance is required—even though its acceleration potential is greater than a pure jet.

On the other hand, there seems to be no reason why particular jet engines could not be designed for more or less

supersonic speed ranges. For years past, propeller designers have been endeavoring to develop cooled multi-stage supersonic fans—and if these can be made to work, their duct-mounted alternatives should be more efficient still.

—James Hay Stevens

How XH-16 Copter Blades Are Formed

Rotor blades of Piasecki's 4th place XH-16 copter, scheduled to fly late this year, are being built around three pressure formed spin tubes.

These extruded tubes are processed by Tube Rolling Corp., Wallingford, N. J., by its Rodette process. This involves cold forming by rotating some circular dies back and forth over the tubing, forcing the metal against a polished mandrel which controls the inside diameter.

Rodette gives the spin tubes structural strength, and closer control of dimensional tolerances, wall thickness and conductivity for minimum heat warping are reported possible with the process.

Finally covers the spin tubes with honeycomb's structure and oil-filled slams—

ing them.

This type of spin tube also is used on Piasecki's HUP and 16 place YH-21 Air Force rescue copter.

Homemade Climate For Equipment Tests

Two custom built units for extreme weather testing of aircraft components have recently been delivered by Bomer Technical Refrigeration division at Bomer, Inc., Torrance, Calif.

The first, a wet-dry chamber built for the Dumas Victor Co., San Carlos, Calif., is to simulate altitudes up to 50,000 ft. or temperatures from -55°F to 165°F. Fusion 12 and Fusion 22 in the refrigeration system drop the ambient test temperature from 140°F to -76°F in about two hours. Pumps evacuate the chamber at a discharge rate of about one mile per minute. Reflective ball treatments help to maintain a 1/2 lb. load at 50,000 ft. and a temperature of -76°F.

The second unit was tailored to the requirements of desert atmosphere testing for Wright Patterson AFB, Ohio. The test chamber is made of stainless steel, so that dust will not adhere to the surface.

Temperatures of 50°F to 165°F combine with wind velocities from 800 to 2,500 kph to simulate desert atmospheres. The measured quantities of dust are added through a Bomer-designed unit and injector to subject the test piece to abrasion and cleaning.

Unit Aids Accuracy Of Optical Tooling

An optical tooling refinement—both an optical reflector and a new feature of the British Taylor Hobson Minox Alpha remote Telescope. This instrument, marketed in the U. S. by Elgin Equipment Co., 431 S. Dearborn St., Chicago 5, Ill., adds the technique of determining target positions (horizontal to line of sight) to the scope's function of check eye point alignment to 300-v. accuracy.



Cooled main rotors and side rotors of Piasecki HUP helicopters are formed from large sheets of PLEXIGLAS. Photo courtesy of Piasecki Aircraft Co., San Diego, Calif.

Helicopters Need Big Noses . . . made of PLEXIGLAS

Pilots have to see up, down, and all around as they put helicopters through the precision paces such aircraft are called upon to perform. That's why pilots of Piasecki HUP models, shown above, are enclosed by nearly a hundred square feet of cooled PLEXIGLAS acrylic plastic. PLEXIGLAS is the standard material for transparent parts on all types of helicopters and fixed wing aircraft because it can be formed to the shapes demanded by today's designs, and because it has the strength, weather resistance,

and overall durability to do its job under severe service conditions.

PLEXIGLAS has kept pace with advances in aircraft performance. PLEXIGLAS is UVA, for example, with improved resistance to heat, weather, and erosion is used by most Air Force and Navy contractors for transparent enclosures on current pressurized planes. For the planes of the future, Rohm & Haas is working to raise the quality of transparent plastics to even higher levels.



"Spot of Flight", is now being shown in the U.S. by the Air Force and Navy in an official training film on the maintenance of aircraft. It is a 16 mm film, 16 min. long, in color and sound. Arrangements for use of this film can be made by writing to the Public Information, Rohm & Haas Company.

PLEXIGLAS is trademarked by R. H. P. Co. and is also registered under the name Plexiglas.

Company locations: Crystal City & Phoenix, Ariz.; 1201 Queen & Hwy. 101, Denver, Colorado, Colorado.

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PRODUCTION



MAGNESIUM assembly is made by Breda & Pirelli for B-47 fire control system.

Stratojet Has New Tailcone Unit

Photo of new tailcone for the Boeing B-47 bomber indicates that the tail unit is a sub-assembled. The turret is topped by a blue indicator light. The turret is coupled with the fire control system. The new tailcone unit is a modification of the B-56 tailcone (supported by USAF as a gun-bearing indicator), and is the indication that the turret is now produced.

The new tailcone assembly is made almost entirely of magnesium by Breda & Pirelli, Inc., Denver, which ships it to GP's Armstrong and Calhoun Stratojet division in St. Louis for installation of the fire control system. GP

assembles, aligns and tests the fire control system in the tailcone assembly before shipping it to the turbine manufacturers. This is believed the first time an aircraft manufacturer has provided that portion of the aircraft which houses the turbine equipment.

The tailcone unit also carries the tailcone unit, which is being "tuned" in the B-47 plant in Wichita (Boeing). This (Douglas) Mervett (Lockheed) tailcone unit is being tested by the B-47 plant in Wichita (Boeing). This (Douglas) Mervett (Lockheed) tailcone unit is being tested by the B-47 plant in Wichita (Boeing).

Willis Gets New Big Forge Hammers

Two giant forge hammers of the same additional units scheduled for operation under the expansion program of Willis-Overland Motors, Inc., Toledo, Ohio, have gone into operation. The two new hammers will be used to produce turbine and engine components for jet planes.

When the expansion program is completed next spring, the new old rotary hammers will add more than 100 cubic ft. to the yearly production potential. Program is expected to

be completed in about 1,000 from half that figure now.

Sealant Saves Porous Castings

A new service for filing and sealing uncoated castings in turbine production is being offered by Sealant Co., New York. The service, available from Sealant Co. (New York), is a new process for sealing porous castings. Sealant Co. (New York) is a new process for sealing porous castings. Sealant Co. (New York) is a new process for sealing porous castings.

can be turned out on a production line with greater certainty than all parts produced will be sealed. Polyplexers are available in lower cost quantities for casting jobs.

Castings are of the plastic, is expected in aluminum and magnesium castings, since magnesium has a low melting point, as low as 1,200° F. Castings are made up in this way, can be used for a variety of aircraft and high pressure applications, the company says such as fuel pumps, valves, collectors, by double components, turbine parts, and so on. The casting is made up in this way, can be used for a variety of aircraft and high pressure applications, the company says such as fuel pumps, valves, collectors, by double components, turbine parts, and so on.

Among production items which have received the treatment are a complex magnesium aircraft engine control unit, magnesium valve for fire control system, and a small magnesium alloy casting which is used for carrying carbon dioxide for automatic life support.

The Polyplexers process uses a chemical which polymerizes under pressure into a solid. Previous methods have used inorganic chemicals such as silicates, from which the water (alcohol) is evaporated, leaving waste where the solvent should be the company says. The new method permits for the first time, a virtually 100% filling job. Polyplexers claim.

The cured resin, a thermosetting type, can withstand temperatures of 150° F. While it is solid, it retains enough flexibility to allow for expansion and contraction of the metal.

Among advantages listed for Polyplexers MC, available in quantities, low viscosity in the monomer state, chemical resistance to aggressive treatment of polymer, low toxicity, good mechanical properties, low cost.

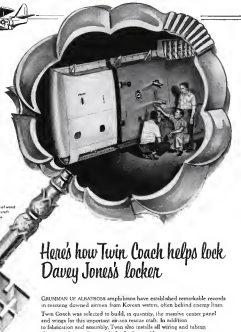
After curing, the method of applying the sealant is in a vacuum pressure tank. With vacuum established, sealant is introduced under a pressure head of 100 psi with the result the resin is both sealed up and forced into pores.

The process is handled by, however, with service now available in Los Angeles area. Where a plant is a large user of material, it may get its own line for the process. Sealant is the registered of Polyplexers International, Inc., 481 Madison Ave., New York.

PRODUCTION BRIEFING

►The Lee Co., Hartford, Conn., maker of aircraft and aircraft control components, has purchased a two-story building in Westfield, Conn., increasing production capacity by 45%.

►Stachurski Corp., South Bend, Ind., has delivered its first jet engine to



Here's how Twin Coach helps lock Davey Jones's locker

GRIMMAN UP ALBATROSS amphibians have established remarkable records in reaching downed wires from Koyan waters, often behind enemy lines.

Twin Coach was selected to build, in quantity, the marine center panel and wings for this important air-sea rescue craft. In addition to fabrication and assembly, Twin also installs all wiring and tubing giving complete sections ready for final assembly.

Twin Coach plants, among the best equipped in the nation, are also in volume production on assemblies for helicopters, attack, and search planes. Modern facilities, modern equipment, and experienced manpower make Twin Coach a dependable source for any type of major defense assembly.



COACH COMPANY
Aircraft Division

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the Air Force for B-47 installations. Designated J47-SI-35, the powerplants are being built under GE license.

► **Malloy-Shannon Fitness Corp.**, Niles, Ohio, has opened a West Coast office at 1338 So. La Brea St., Los Angeles, with George H. Denny as chair.

• **Ransom Art Metal Works, Inc.**, Newark, N. J., has acquired a 32,000-sq-ft plant to add an additional work production expansion.

• **Skid Camp**, is the new name of Skid vna, Inc., Chicago, maker of portable and permanent tools.

*Tidechem, San Lorenzo, Calif., Transocean Air Lines subsidiary, has been awarded U. S. distribution by Wyndotte Chemical Corp. Rights in several foreign countries are included.

• Westinghouse Electric Corp.'s Electric division, has received a \$5 million New contract for installation of disk-edge access elevators on the super tower USS Freedom. The elevators will be 60x60 ft.

USAF CONTRACTS

Following is a list of USAF contracts received announced by Air National Command:

Reviews, Fresh, Apples: 1711 Strand-
wa: New York: collection of a noted po-
et: 1. 40. 1811-1821

Seung-In Ahn, 40, Long Beach, Calif.,
special agent, FBI

Wetzel-Hessman, Inc., Ltd. Amherst, Mass.
 1950-1951, 1952-1953, 1954-1955, 1956-1957, 1958-1959, 1960-1961, 1962-1963, 1964-1965, 1966-1967, 1968-1969, 1970-1971, 1972-1973, 1974-1975, 1976-1977, 1978-1979, 1980-1981, 1982-1983, 1984-1985, 1986-1987, 1988-1989, 1990-1991, 1992-1993, 1994-1995, 1996-1997, 1998-1999, 2000-2001, 2002-2003, 2004-2005, 2006-2007, 2008-2009, 2010-2011, 2012-2013, 2014-2015, 2016-2017, 2018-2019, 2020-2021, 2022-2023, 2024-2025, 2026-2027, 2028-2029, 2030-2031, 2032-2033, 2034-2035, 2036-2037, 2038-2039, 2040-2041, 2042-2043, 2044-2045, 2046-2047, 2048-2049, 2050-2051, 2052-2053, 2054-2055, 2056-2057, 2058-2059, 2060-2061, 2062-2063, 2064-2065, 2066-2067, 2068-2069, 2070-2071, 2072-2073, 2074-2075, 2076-2077, 2078-2079, 2080-2081, 2082-2083, 2084-2085, 2086-2087, 2088-2089, 2090-2091, 2092-2093, 2094-2095, 2096-2097, 2098-2099, 2100-2101, 2102-2103, 2104-2105, 2106-2107, 2108-2109, 2110-2111, 2112-2113, 2114-2115, 2116-2117, 2118-2119, 2120-2121, 2122-2123, 2124-2125, 2126-2127, 2128-2129, 2130-2131, 2132-2133, 2134-2135, 2136-2137, 2138-2139, 2140-2141, 2142-2143, 2144-2145, 2146-2147, 2148-2149, 2150-2151, 2152-2153, 2154-2155, 2156-2157, 2158-2159, 2160-2161, 2162-2163, 2164-2165, 2166-2167, 2168-2169, 2170-2171, 2172-2173, 2174-2175, 2176-2177, 2178-2179, 2180-2181, 2182-2183, 2184-2185, 2186-2187, 2188-2189, 2190-2191, 2192-2193, 2194-2195, 2196-2197, 2198-2199, 2200-2201, 2202-2203, 2204-2205, 2206-2207, 2208-2209, 2210-2211, 2212-2213, 2214-2215, 2216-2217, 2218-2219, 2220-2221, 2222-2223, 2224-2225, 2226-2227, 2228-2229, 2230-2231, 2232-2233, 2234-2235, 2236-2237, 2238-2239, 2240-2241, 2242-2243, 2244-2245, 2246-2247, 2248-2249, 2250-2251, 2252-2253, 2254-2255, 2256-2257, 2258-2259, 2260-2261, 2262-2263, 2264-2265, 2266-2267, 2268-2269, 2270-2271, 2272-2273, 2274-2275, 2276-2277, 2278-2279, 2280-2281, 2282-2283, 2284-2285, 2286-2287, 2288-2289, 2290-2291, 2292-2293, 2294-2295, 2296-2297, 2298-2299, 2300-2301, 2302-2303, 2304-2305, 2306-2307, 2308-2309, 2310-2311, 2312-2313, 2314-2315, 2316-2317, 2318-2319, 2320-2321, 2322-2323, 2324-2325, 2326-2327, 2328-2329, 2330-2331, 2332-2333, 2334-2335, 2336-2337, 2338-2339, 2340-2341, 2342-2343, 2344-2345, 2346-2347, 2348-2349, 2350-2351, 2352-2353, 2354-2355, 2356-2357, 2358-2359, 2360-2361, 2362-2363, 2364-2365, 2366-2367, 2368-2369, 2370-2371, 2372-2373, 2374-2375, 2376-2377, 2378-2379, 2380-2381, 2382-2383, 2384-2385, 2386-2387, 2388-2389, 2390-2391, 2392-2393, 2394-2395, 2396-2397, 2398-2399, 2400-2401, 2402-2403, 2404-2405, 2406-2407, 2408-2409, 2410-2411, 2412-2413, 2414-2415, 2416-2417, 2418-2419, 2420-2421, 2422-2423, 2424-2425, 2426-2427, 2428-2429, 2430-2431, 2432-2433, 2434-2435, 2436-2437, 2438-2439, 2440-2441, 2442-2443, 2444-2445, 2446-2447, 2448-2449, 2450-2451, 2452-2453, 2454-2455, 2456-2457, 2458-2459, 2460-2461, 2462-2463, 2464-2465, 2466-2467, 2468-2469, 2470-2471, 2472-2473, 2474-2475, 2476-2477, 2478-2479, 2480-2481, 2482-2483, 2484-2485, 2486-2487, 2488-2489, 2490-2491, 2492-2493, 2494-2495, 2496-2497, 2498-2499, 2500-2501, 2502-2503, 2504-2505, 2506-2507, 2508-2509, 2510-2511, 2512-2513, 2514-2515, 2516-2517, 2518-2519, 2520-2521, 2522-2523, 2524-2525, 2526-2527, 2528-2529, 2530-2531, 2532-2533, 2534-2535, 2536-2537, 2538-2539, 2540-2541, 2542-2543, 2544-2545, 2546-2547, 2548-2549, 2550-2551, 2552-2553, 2554-2555, 2556-2557, 2558-2559, 2560-2561, 2562-2563, 2564-2565, 2566-2567, 2568-2569, 2570-2571, 2572-2573, 2574-2575, 2576-2577, 2578-2579, 2580-2581, 2582-2583, 2584-2585, 2586-2587, 2588-2589, 2590-2591, 2592-2593, 2594-2595, 2596-2597, 2598-2599, 2600-2601, 2602-2603, 2604-2605, 2606-2607, 2608-2609, 2610-2611, 2612-2613, 2614-2615, 2616-2617, 2618-2619, 2620-2621, 2622-2623, 2624-2625, 2626-2627, 2628-2629, 2630-2631, 2632-2633, 2634-2635, 2636-2637, 2638-2639, 2640-2641, 2642-2643, 2644-2645, 2646-2647, 2648-2649, 2650-2651, 2652-2653, 2654-2655, 2656-2657, 2658-2659, 2660-2661, 2662-2663, 2664-2665, 2666-2667, 2668-2669, 2670-2671, 2672-2673, 2674-2675, 2676-2677, 2678-2679, 2680-2681, 2682-2683, 2684-2685, 2686-2687, 2688-2689, 26

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Editorial: K.H. J. Kerkstra and K. Van Dalen



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^aCommon *Eleusine indica* species; all other species are rare.

Baron de H. J. J. Muller



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Lucashevskiy Scientific Corp., Norbark Hills, Calif. co., 104119; U.S.A. mobile training unit, 1 co., 104120.

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 Industrial, Inc., 701 S. Michigan Ave., Chi-
 cago, Illinois 60605-1914, 847/388-
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Integration Corp., 2100 N. W. Highway,
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18193 Magnolium insipidum (L.) Lam.
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R. 10020 Providence 44, R.I. 02915
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Boston, Pa. type B-4 automatic back
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snout. Chin protruding just above pteph.
Sta. 170 cm, 1170 mm; protruding ptephers.
new infra. dala. 78 cm, 1170 mm

Wendell Co. Hwy. 2, 101 Cedar St.

FOOT SPEKTRON & TOOL CO. 1488 ELMER ST.

Freemake Products Corp., 100 W. 40th St., 10th fl., New York, NY 10018-3292

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 500 CHERRY ST. N. Y., 10038
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 to a major paper mill and 400 ft
 from the river.

North American Aviation, Inc., Los Angeles, California, aircraft cylinder 4 and 5. N79-200

Northrup Dodge Co., Inc. 145-146 W. 22

Glennville Co., Pacific, N. J. inside power

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each year in Hamburg. As there—where doctors, scientists, experts and Service's heads from all parts of the First World—now, actually captures the imagination and dominates the flying displays. In 1933 by several accidents the Aero club moved on there all others. Product of Aero's patient years of meticulous research and flight testing on the Delta platform, the type is the most formidable and modern bomber in existence. It will carry a bigger-payload faster, higher, further and more economically than any other aircraft.

As a result, the Deutsche Luftwaffe Group have now given the R.A.F. 185, flown by the interviewee, the Aero Club, in the hands right and left under the engine, the Delta was Colonel Jackson and some very word of rendition in out of action, the Aero club. Were in proud indeed of world leadership in Aero's.

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If you were asked to list the requirements of an ideal alloy for general non-structural aircraft use, you'd probably put down:

- Resistance to corrosion
- High Strength and Toughness
- Hardness
- Heat Resistance
- Ductility
- Good working properties

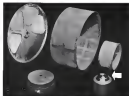
You can add to this list, of course. You might, for example, include good impact resistance or spring properties among the things you consider important. You'd find all these characteristics — and others, too — in the nickel-copper alloy, Monel.

A simple, nickel-sulfur alloy, Monel is resistant to corrosion by aircraft fuels, salt water and other corrosives.

Monel is stronger than mild steel. It retains its strength up to about 900°F and useful strength up to 1000°F, has good resistance to fatigue, and increases in strength at sub-zero temperatures without significant decrease in ductility or impact strength.

Like most nickel alloys, Monel is readily workable. It can be fabricated into any equipment which can be made of steel.

Forging, machining, and tube pipe bending, welding, brazing and soldering can be handled by methods in everyday use. Through all manufacturing



They Safeguard Aviation Fuel. These are important working parts of a regulator that removes water, silt and foreign matter from aircraft fuel. Monel's resistance to the tip of a fuel line like the one shown above (left) is important. The Monel valve disc provides a positive seating, leak-proof seal. The strong, tough Monel stem is ground to a fine finish and is completely resistant to fuel and foreign matter and gas.

ing and fabricating operations, and throughout its service life, Monel retains its essential characteristics.

Because it offers all these advantages, you can see why Monel is a wise choice for the fuel discs and stems pictured above. They are vital parts of a regulator developed to remove dirt, grit and water from aviation fuel before it goes into the planes. The Monel parts not only give trouble-free service, but they also provide a safeguard against fire. For Monel, in addition to its other characteristics, is low-sparking.

There are probably times when you can put such an unusual combination of properties to work. Keep Monel in mind for applications where its qualities can simplify fabrication operations, reduce maintenance problems or contribute to air safety.

You'll find detailed information about Monel (and its companion alloy, "B" Monel) in our 28-page reference manual, *Engineering Properties of Monel and "B" Monel*. We'll be glad to send you a copy — without charge or obligation. Just write and ask for Technical Bulletin T-8.

Meanwhile, we hope you'll remember that Monel — like all Inco Nickel Alloys — is an extended delivery because of defense needs. When you order, therefore, it's important to include NPA rating and complete end-use information.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 24, N. Y.



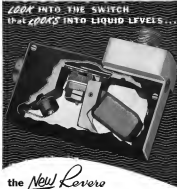
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TENSILE STRENGTH OF MONEL RIVET WIRE		
Temperature of Heat, °F.	Monel Strength, psi	"B" Monel Strength, psi
Room	48,000	54,000
1/2 hr. at room temperature		
500	48,000	54,000
750	54,000	60,000
1000	54,000	60,000
2 1/2 hr. at room temperature		
500	54,000	60,000
750	60,000	66,000
1000	60,000	66,000

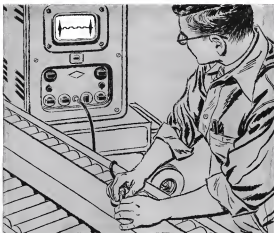
Republic Open House



↑ **MUNDY PEALE**, president and general manager of Republic Aircraft Corp., looks at the first production F-84F, mounted on portable jet display during company's annual "open house" at Farmingdale.

← **PORTABLE TRAINERS**, such as this fuel system and vacuum electrical, air conditioning and hydraulic systems in the F-84F are made by Republic's P-8, Washington, tool division for shipment to NATO and USAF units in Europe. The trainers are specially designed for air shipment.

↓ **PRODUCTION LINE** of lightweight F-84Fs is rolling at Republic's Farmingdale, N. Y., plant. The company has orders for an undetermined number of the jet fighter-bomber unit, powered by 7,500-hp-turbo, Convair Wright-built J-65 engines. The F-84 is designed for fuel-air refueling, but the loading receptacle has been moved to the upper surface of the wing from the leading edge, where it was on the earlier G model.



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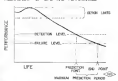
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AVIONICS



RELATIONSHIP OF LIFE AND PERFORMANCE



FAILURE PREDICTOR developed by Bureau of Standards depicts relationship between life and performance, shown at right.

Search Is on for Electronics Reliability

NBS device will improve equipment dependability by forecasting breakdowns, conference hears.

By Philip Klum

Changes—The number and problem-solving nature of electronic design tools is that of obtaining greater reliability, judging from the recent three-day National Electronics Conference, held in this city.

The technical session on electronics, which had been last year's conference favorite, according to one NBS official, ran a pace that was fast in the sessions on reliability, and on reliable computer applications, all three held on the same afternoon. An estimated 300 people crowded into the standing room to hear papers on reliability.

• **Keywords**—Ideas and techniques for improving reliability were not limited to the one specific session, the subject came up frequently in papers given in other technical sessions.

Even the three keynote addresses spoken around the subject.

• **Reliability**... should be our more objective in reliability electronics," stressed E. W. Fagundes, vice president in charge of RCA's laboratory.

• **The solution** lies "in ever increasing appreciation of the importance of reliability," said Maj. Gen. George E. Bock, Chief Army Staff Officer.

• **Keywords**—Highlights—Equipment and techniques of special interest in the electronics field included:

- Portable failure predictor to forecast of approaching component failure.
- Techniques for detecting early formation of electronic reliability problems before a major system failure.
- Short-life testing method for components to be used beyond normal rating.
- Continuous monitoring system to speed up diagnosis and repair process.
- Improved methods on storage tubes which will give better radio scope pictures.

• **New type** methods, and possible transmission media of electronic circuits with improved response.

• **Improved** magnetic tape systems, with faster read and greater response.

• **Grounded** systems resistant for air coils.

• **Thin** printed-circuit connectors for interconnecting printed circuit boards.

• **Automatic** failure response for problems printed circuit assemblies.

• **NBS Failure Predictor**—The National Bureau of Standards has developed a failure predictor designed to spot early signs of component deterioration which if undetected could eventually lead to component failure. The device is not intended, however, to give advance warning of the "sudden death" type of

component failure such as fractured leads in a vacuum tube.

The predictor was built around equipment very old in the hands of a designer, i.e., vacuum tubes. Tubes should be completely replaced at regular intervals. When replacement is intended to avoid failure by slow deterioration. However, it does so at the risk of introducing some sudden death type failures.

Most sudden death failures in tubes occur during the last few hundred hours of use, when tubes reach "sudden death" without failure, they have passed the high reliability period and run, give less trouble than new tubes, providing, of course, they haven't deteriorated too badly in performance. The failure predictor could schedule "sudden death" tubes which were still in good operating condition and thus, there is no reason to replace them.

• **Pool of the Predictors**—NBS took its experimental failure predictor on its 15 stage radio system which was subjected to 1,000-hour accelerated aging tests (normal conditions of aging equivalent). At regular intervals the vacuum tubes were checked with the predictor.

The device enabled NBS to spot almost 75% of all tube failures many hours before they actually caused equipment failure. J. H. Merritt of NBS said. This represented 95% of the non-deterioration type tube failures which are possible to predict.

The 10% failures which the predictor might have caught, but didn't, included:

- Two tubes in "non-critical" stages not being checked.
- Four tubes in a single stage where

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RF&A experience in aircraft radio system transmission design, including extensive background in manufacturing operations. Philosophy in aircraft radio systems derived. Responsibly for transmission design of most land, sea, or aircraft radio systems with radio modulators. A degree in mechanical engineering is preferred. However, equivalent experience will be accepted.

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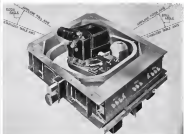
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PLATFORM developed by Goodway Aircraft Co. keeps control level, aligned in aircraft.

positive qualifications interrelated with the measurement.

One tube whose change in characteristics was caused by a change in the value of an unbalanced reactor.

Of the tube makers which were not particularly predictable, all were either open or closed during half of which occurred during a single hour of operation. There were occasional failures of components other than tubes. Hence, said to partly any conclusion as to their predictability.

How It Operates: The experimental NBS prefilter checks the voltage gain of three radio receiver stages whose performance is severely affected by weak or poor tubes. Receiver stages which NBS tagged as "critical" were R.F. amplifier, first mixer, low IF amplifier, second mixer, two stages of low IF, two crystal oscillators, and two frequency modulators.

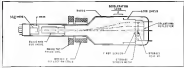
Gain checks of three "critical" stages are made by connecting each tube and its associated components in a meter-oscilloscope amplifier. A 1,000-cycle input signal is then applied and the output voltage checked. Macy cautioned that stage-by-stage checks are

usually, overall input-output checks are used, independent changes in radio dual stages, he said.

NBS modified the receiver spider test to enable the procedure to be easily converted to the radio process and to permit rapid stage-by-stage checks by merely positioning a selector switch. This involved "breaking" the grid and plate extra leads, coating them with a wettable point connection, and adding a few passive components such as capacitors and R.F. chokes. (Each modification wouldn't be needed if the original equipment were actually designed to accommodate a procedure.)

Easy To Use—NBS wanted its procedure to provide a direct "good, so good" indication to permit its use by a semi-skilled operator without requiring the reading of a voltmeter and the tedium of interpreting the results. For this reason the response of the 1,000-cycle input signal is preset for each different selector switch position to produce a single output voltage from many possible functioning stages.

If the output voltage falls outside established limits, a voltmeter-measurable warning current in the indicator triggers



IMPROVED RATHBURN cathode tube can store intelligence for as long as a week.

a red warning light, giving positive indication of pending failure in the stage under test. Without much added complexity, Macy said, a stepping switch could be used in the selector switch to automatically check each stage in sequence, stopping whenever it discovers a weak stage.

Admitting that the principles used in the NBS design are not new and that the unit is only an experimental start, Macy urged designers to incorporate fault-indicating provisions in their own equipment.

Why Components Fail—A detailed analysis by Bell Telephone Labs of 202 components which had failed in selected Navy Bell-type electronic equipment succeeded in pinpointing the basic causes of failure:

- 93% failed because of poor component quality (obscure is component manufacturing).

- 25% failed because of previous failure of other components in the circuit.

- 25% failed because they were not sufficiently rugged to withstand military use and environment (no application).

The cause of failure in 154 other components in the Bell-type units could not be established as is still under study. G. C. Hines of Bell Labs and he explained that field engineers' concern in the equipment malfunctions accompanied the defective components and added Bell materials in its circuits.

These urged equipment manufacturers to apply life analysis to component failures in order to develop fault corrective actions, he also called for improved inspection and quality control procedures by component manufacturers.

Mechanical v. Electrical Failure: Don't overlook the importance of good mechanical design in your search for reliability, Victor Hines of Vero Corp. of America warned his NRC audience.

A recent study of Bell-type electronics and solder connections showed that no electrical faults caused less than half the equipment failures but were responsible for 63% of the equipment "down time," Hines added. "The less time loss for electronic equipment to rely on the mechanical engineers for help."

Speeding Soldering—Cathode interface misalignment (sometimes called "drawn cathodes") because a breakdown in electron tubes more rapidly during steady use (drawn) can cause trouble in communications and in communications equipment. H. M. Wagner of the Bell Corp. Parametrix lab warned. Many tube failures which previously were blamed on loss of tube emission and transmission distance have more recently been due to cathode interface impedance. Wagner said.

Wagner described a test procedure which will spot interface impedance in



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FREE engineers faced three basic requirements in specifying FASTENERS for the AN-AMT-44 Radiosonde First Instrument had to be light-weight, since the device is set free and carried to upper altitudes by balloons. Second, the equipment is replaceable, making economy a prime factor. And third, because the Radiosonde transmits vital weather data back to the ground, its precise altitude demands rapid, vibration-resistant fasteners for proper operation.

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AN ATTACK This alone could be sounded in the U.S. If it is, there must be protection.

The U.S. Air Force is ready to answer any alarm—with squadrons of Lockheed Starfire interceptors* that can climb quickly to the attack, locate and knock out invading bombers in any weather, day or night.

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And there are only two ways to spot an air attack: (1) by radar, (2) by human eyes. Lockheed's solution is to use both. Lockheed's radar system is operating under 5,000 feet. So we badly need civilian observers.

Then, airplanes are being built to take our radar warning system off the ground. For this job Lockheed is producing FV-3 Early Warning Commanders with 360 degree radar.

Also the Navy has early Lockheed F2V Neptune on antisubmarine patrol day and night. These "eyes" guard against air attack too.

But we still need an additional 200,000 men and women observers to fill the Lockheed radar gap. You give just a few hours a week. Call your Civilian Defense Office, or write to Ground Observer Corps, U.S. Air Force, Washington 25, D.C.



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GROUND OBSERVER CORPS NEEDS 200,000 VOLUNTEERS

Early this summer top U.S. Air Force officials met with Civilian Defense directors from 46 states and four territories, and reviewed in confidential detail the recent efforts to defend America from surprise enemy attack.

"Despite a \$400,000,000 radar network around the nation's perimeter, gaps exist through which enemy aircraft could penetrate our defenses undetected," the meeting was told.

That's why America needs a total of 200,000 civilian skywatchers as members of the Ground Observer Corps. Nearly 200,000 have already volunteered.

The only practical means of lifting the gaps in our defenses is through a 24-hour operation by civilian volunteers," the meeting was told.

Why isn't America's radar network sufficient?

Defense gaps exist because of radar's line of sight principle and radar's failure to penetrate square waves. Every mountain, every hill, every shadow behind which enemy aircraft could sneak undetected from a perfectly flat country for centuries on the north shoreline the effective range, equally allowing radar to be invisible to jamming.

These gaps cannot be filled by Air Force personnel due to the staggering expense. That's why in these areas needed in 24 general states to form Ground Observer Corps stages 24 hours a day. Here is a critical, patriotic job that requires just a few hours a week from each volunteer.

Aircraft too are an important part of our national warning system, and of course are the backbone of defense against attack. There are advanced Lockheed planes play a vital role.

The W-12 Super Constellation Early Warning Aircraft, developed for the Navy and the Air Force to detect radar's range in a whole new concept of national defense.

The P2V Neptune Navy Patrol Bomber, charged by the Navy with anti-submarine patrol and protection of U.S. coastal waters.

And the F-94C Starfire, the mobile automatic all-weather interceptor, which does the final job of knocking out the attack at traffic level, leaving the invaders, and shooting them down with more than 6,000 rockets.

When the U.S. has all necessary planes and personnel—civilian and military—it will be difficult for enemy aircraft to penetrate U.S. defenses.



VIBRATION: why Sperry beam includes computer accuracy of position data

its early stages, even to bend new tubes. The technique uses low amplitude test pulses and a low-duty cycle to minimize the possibility of exceeding material strength during the test.

• **Sub-Mic Tube Kicks**—Submicron tubes using blowers are now rugged and reliable than those using heater-cathodes according to John Wood of Kryptonik Mfg. Co. Wood says blowers have more tubes are more rugged because:

- **Heater-cathode** sheets and leakage is eliminated.
- **Power** needs less electrical cost than heater-cathodes.
- **Lower** frequency operating temperature is used.
- **Physical** changes between filament and grid is lower in cost.
- **Sadder** filament tube reduces danger of shock damage to supports.

• **Higher** ultimate frequency possible with filament-type tube reduces interference effects.

Under constant conditions (constant voltage, power, temperature, etc.) as indicated, Matheson tested 10,000 tube type tubes which showed an average life expectancy of over 5,000 hours, Wood said. A breakdown of these tests showed:

- **Class** Failure—1 per 5,000,000 tube hours.
- **Mechanical** Failure—1 per 100,000 tube hours.
- **Electrical** Failure (filament in short-circuited)—1 per 70,000 hours.

Wood says close liaison between the component designer and the tube manufacturer is most correct tube application and usage.

• **Short-Life Ratings**—Most vacuum components are rated at operating temperatures and loads which cause a

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service life of 1,000 hours or more, is pushed, twisted, and crumpled other equipment, component life can be considerably shorter than 1,000 hours.

These outgases can be operated at much higher loads and temperatures, saving space and weight, if shorter life is acceptable. But the big question is: How much can the tubing be tipped for short life use?

A. P. Jernick and W. T. Schmitt, Jr., of the Battelle Memorial Research Institute, described a new technique for obtaining short-life ratings on oxygen coils. They call it the "Shen-Serp Method."

Experiments, tests on carbon film monitors indicate that the new method reduces the cost and time required to establish short-life ratings. Jernick said. It also gives results which show more consistency between individual components in a test batch than are obtained with previous methods. Jernick said.

• **Small Automatic Lens-Magnify** magnification of lens removed is demonstrated (except for aerial domain research) with a new small adapter developed by Space Cyber. This cuts the time needed to obtain a picture for the J2 tube adapter is designed for use with the Space Cyber frequency (1950 Hz) lens corrector.

Clair Guard tests to date show that the new device improves accuracy in establishing day or night position by a factor of two or three. It is one, according to Roger Williams of Sperry who delivered the paper.

(Lens is a navigational device which establishes a "line of position" based on the phase difference in radio pulses transmitted simultaneously from a pair of geographically displaced ground stations. If two pairs of ground stations are used, two distinct lines of position can be obtained, where intersection fixes a ship's or an aircraft's position.)

Alignment of the leading edges of the two radio beams, now performed manually is automatically accomplished by a servo system in the new Sperry device. If the continuous-indicator adapter is used with two-lens receiver, a receiver can obtain almost instantaneous position fix—as important factor in high-speed search.

• **Better Accuracy-Tests** to date show that a vacuum operator can generally match peak-time differences within three microseconds, whereas the new adapter cuts the time to one microsecond, under conditions of 10 times to nine, says Williams said. Under more adverse 1.0 signal to noise conditions, manual alignment averaged out to five microseconds compared to only three microseconds for the new device.

Williams explained that even with the new adapter, the vacuum operator must first acquire the station signal.

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Here's **UNIFLEX**—the new, radically-concepted Stainless Flexible Tube. It's tough, corrosion-resistant, leak-proof. And its bellows construction gives it greater flexibility, and longer life in applications too extreme for ordinary corrugated tubing. Use it when you're concerned with hydraulic lines, oil, bearings, refrigeration machinery, air conditioning equipment, pump compressors, diesel or turbine tools. For business service, Uniflex fittings have metal-to-metal seal. And is produced through spring water effect of heat on fitting body.

TITEFLEX BELLOWS are the efficient means of absorbing local movement in many types of equipment. Their welded, corrugated-displacement construction lets them do that without weakening the flange in which they are mounted and without reducing the flow rates of gases or liquids being conveyed. You can use TITEFLEX BELLOWS to seal high pressure valves and shafts, accommodate thermal expansion and expansion of high frequency vibrations, and to handle gases and corrosive liquids under high temperature conditions. Special designs are available and complete bellows assemblies can be furnished with any required types of fittings.



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Standard wire stream coupling, flexible, standard construction of Titeflex.



Note the bellows corrugated, pressure and shock of bellows.



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to be sure he has looked on the ground wave and not the skywave. After initial signal acquisition, a very accurate ranging gate, in this adaptor prevents the receiver from locking on the skywave. With this unit.

► **Improved Storage Tubes**—Two improved versions of cathode ray storage tubes are described by engineers from Raytheon Mfg Co and Radio Corp of America. The storage tube looks at first like a vacuum tube, but it is not. It is a storage tube, and it is used to store data in a computer. It is a storage tube, and it is used to store data in a computer. It is a storage tube, and it is used to store data in a computer.

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added bit of information to make available. A viewing target will thus produce a "map" whose length is proportional to the target's relative speed. The storage tubes also improve signal-to-noise ratio because the receiving nature of the signal makes it appear at much higher intensity than signals arriving "noise".

Two types of storage tubes were described.

► **Single-gun storage tube** in which "writing" and "reading" functions are alternately performed by a single electron beam as described by R. C. The generator at Raytheon. The improved version has a new "electron gun" which

focuses the beam so that it strikes the screen perpendicularly. Writing speed, he said, is about 45 microsecond per line, timing or reading time is about ten times as long.

Already in pilot production, the new tube can store information for periods up to one week, without noticeable deterioration and can provide more "playback" without loss of stored information. Raytheon said.

► **Two-gun storage tube**, called the Gasplexicon, has been redesigned to require neither gas nor vacuum. It requires neither gas nor vacuum. It requires neither gas nor vacuum. It requires neither gas nor vacuum.

A newly added circuit element, he suggested, the advantage of acceleration by reducing secondary electron effects. Dyll said. The tube has a 201 signal-transmit tube and gives a maximum resolution of 400 lines. However, Dyll said, the maximum writing speed is not sufficient to give precise (half-line) resolution.

► **Cathode Solid Transistors**—Cathode solid crystals have attractive rectifier characteristics and show promise as "n-type" transistors. Gene Strell at Northwestern University said. He described test results which showed that cathode solid rectifiers will:

- Operate from 0.1 to 40 v, optimum operating voltage is about 7 v.
- Withstand twice the maximum rated voltage without permanent damage.
- Withstand twice the destructive voltage for 3 seconds without damage.

Strell said that cathode solid transistors have been made which give pre-amplification, but no amplification. The difficulty of making contact to the crystal appears to be the main barrier to a successful cathode solid transistor. Strell said. He also reported that cathode solid rectifiers show a strong photoelectric effect.

► **Nonlinear Servo**—A nonlinear servo system which uses a changeable damping ratio to maintain its dynamic response was described by R. N. Davis at the University of Illinois. A low damping ratio is used at the start to permit rapid motion. Once the error signal reaches zero (at the point of actual overshoot), an automatic switching device changes to a high damping ratio, giving critical damping.

Another analog magnetic servo system which is better for small error signals but which switches over to operate at maximum torque, accurate position, for larger error signals was described in a paper by R. C. Bee and R. C. Matthews of Good Research Laboratories. The authors say the technique gives superior response than conventional linear systems.

► **Mag-Amplifier Servo**—More high



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performance servo apparatus previously restricted to vacuum tube amplifiers may now utilize the advantages of magnetic amplifiers with less loss of performance. At the Woodson of the Naval Ordnance lab and in using the use of half-wave, magnetic amplifiers in bridge-type circuits.

Stabilization of half-wave amperage for servo systems using conventional techniques is difficult, Woodson says, because the time constant of the system changes with gain. This hampers such systems to lower gain operation. The half-wave bridge-type amplifier for exact offset maintains possible time constant (natural cycle of supply frequency), and gain has no effect on time constant, Woodson says. Another advantage to the half-wave units is their ability to accept either a c or d-c signal without a demodulator.

Woodson described a 400-cps 2-stage magnetic servo system developed by the Naval Ordnance lab. It uses a 2-phase a-c motor with tachometer stabilization. The system has a natural frequency of 60 cycles per second and a corresponding phase shift of 50 degrees, Woodson said.

Stabilized Control Mount—The design of a self-pitch, and precision stabilized aircraft control mount, including an analog computer machine of the stabilizing servo system, was described by F. J. Horvath of Goodrich Aircraft.

The control mount was designed to maintain the correct level and yaw stability, within 0.4 and 0.5 deg. respectively, under maximum velocities of 90 deg./sec. and maximum acceleration of 500 deg./sec.². It uses an analog computer unit to permit servo systems visibility having a time scale of 4 mil (sec) was Goodrich's own CERA analog computer.

Missile Guidance System Outlined

An inertial-type navigation and guidance system which determines true groundspeed, direction of motion, and distance traveled by a missile or airplane without using radio aids is described in a recently granted patent.

Integrating Accelerometer—The patent sets forth a measuring accelerometer which is gyro-stabilized to enable it to measure acceleration (inertial forces) resulting from airframe or missile motion in an east-west and a north-south direction. Electrical signals proportional to these inertial forces are independently integrated to give airframe or missile velocity in the east-west and north-south directions.

Another integration of the signal gives distance covered along the same two mutually perpendicular directions. The north-south, east-west velocity

signals could be visually displayed, the patent says, on motion or on a cathode ray tube to show groundspeed and direction of motion. The north-south, east-west distance signals could be fed to a specialized electro-mechanical computer to calculate present position based on the known starting position of the missile or aircraft. The device could also give guidance signals to an autopilot.

Patent Problems — The patent doesn't go into the design of the double-integrating accelerometer. But when the accelerometer is extremely sensitive and accurate, and the integrator's error are small, a very large cumulative error could build up. The patent also does not discuss how the east-west and north-south components would be resolved relative to the earth's vertical.

Background—The patent, No. 2,613, 073 was filed in June 1947 by Paul G. Harrel, Concordia, N. Y., a research engineer, and granted on Oct. 7, 1952. It shows an example of an Analog Servo system.

From 1941 to 1947, Harrel was chief of the radio direction finding research group in the Naval Corps Lab. Since that time he has been engineer in charge of the radio engineering department of Servo Corp. of America.

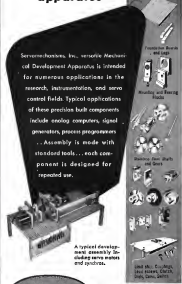


Computer Solves 7th Order Equations

A low cost electronic analog computer which can solve 7th order differential linear total equations, and nonlinear equations if auxiliary equipment is used, has been announced by Servo Instruments Inc.

Called EASE (Electronic Analog Solving Equipment), the device can play mechanical total nonlinear equations which enable a purchaser to select elements and linear auxiliary computer to his individual needs. Additional information is available in Bulletin 294-67 from Servo Instruments Inc., Special Products Div., South Pasadena.

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NEW AVIATION PRODUCTS



Jet Engine Pump

A new compact jet engine pump assembly for jet engines combines two previous and one storage pump element, and an accessory drive and mounting pad. It is being produced in Korea.

The accessory drive can be used for turbochargers and other engine-mounted units. Rated capacity of each pressure pump element is 25 gpm and 6 gpm for the storage. Rated speed is 1,200 rpm, and a discharge pressure of 90 psi, and rated inlet pressure of 35-50 psi, Elg. 40404.

The assembly operates at 65 F using grade 1000 jet lubricating oil (MIL-G-10551) in the pumping cylinders. Each pump element is a positive displacement, non-pulsating, rotary-vane type. Weight of entire assembly is 3.5 lb. Avco. Div., Lear, Inc., 118 Ross Ave., N. W., Grand Rapids, Mich.



Isolation Amplifier

A three-channel audio isolation amplifier which permits moving of signals from receivers whose outputs could not otherwise be combined has been developed by Phil-Tronics, Inc.

The equipment, CA-1, permits single or mixed voice, melody, range and other audio signals on one or more level speakers. It eliminates squawking that signals be switched to various music re-

ceivers. The isolation amplifier can be front-mounted with the M-3 Master Station receiver made by the firm, which it follows closely in external styling and use.

Two CA-1s can be used to provide complete channel isolation in the cockpit between the pilot and co-pilot, according to the firm.

A special two-day warning circuit which prevents marker signals from continuing with plane tower talk also has been included. The arrangement does not affect visual marker indications. Audio output of the marker signal is accomplished when the pilot presses the microphone button to transmit. The time delay feature is activated on release of the button, cutting marker signals on additional 30 seconds, so the tower can transmit back without interruption.

The unit weighs 34 lb., measures 10 1/2" x 10 1/2" x 10 1/2" inches. Price: \$1,000. Phil-Tronics, Inc., 3385 Boston Ave., Burbank, Calif.



High-Slip Motor

A new type, high-slip induction motor which, it is claimed, will reduce operating costs because there is no loss of electrical efficiency has been announced by General Electric Co. The new unit is totally enclosed and fan-cooled, and is designed to accelerate high-inertia loads such as punch presses, centrifuges, fans, etc. A new extended bar design allows efficient dissipation of heat, G.E. says, resulting in the motor being 10% smaller and 40% lighter than conventional designs.

Low-vibration motor bars are extended as size and all the motor and gas through a rotating buffer plate, the bars are then forced to rings of high resistance metal in the form of a radial blade fan. The fan blades provide the higher rotor resistance necessary for high-slip characteristics.

The new motor, designated Type KRX, is available in 30 to 150 hp at 900 and 1,200 rpm, with 5-to-8, and 8-to-33% slip. Voltage ratings are 220, 440 and 550.

General Electric Co., Schenectady 5.



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CAB Accident Investigation Report on PAA Puerto Rico Crash

Maintenance, Flying Technique Blamed

The ditching of a Pan American World Airways DC-4 near San Juan, Puerto Rico, on Apr. 11, 1952 with the loss of 52 lives is blamed by the Civil Aeronautics Board on poor maintenance by the carrier and questionable flying technique by the pilot. The aircraft

and 11 passengers were saved. CAB's complete report.

THE ACCIDENT

A Pan American World Airways aircraft, a Douglas DC-4, N 30399, was ditched at approximately 1220/ Apr. 11, 1952, about

11 miles northwest of San Juan, Puerto Rico, after taking off from the Caguas Airport. On board were 56 crew members and 64 passengers, including an infant. Only two passengers had their belts in a crash of this ditching, and the aircraft sank at water approximately 7,000 feet deep and could not be recovered.

HISTORY OF THE FLIGHT

Pan American World Airways Flight 1204 originated at San Juan and departed there at 1201, Apr. 11, 1952, for New York, N. Y. The crew consisted of Captain J. C. Berry, First Officer W. F. Holliman, Second Officer J. R. Lombardi, Flight Attendant A. Ferris, and Steward E. Turner. According to company records, the aircraft at the time of ditching weighed 11,666 kg. (25,726 lb.), which was within the absolute gross take-off weight of 11,213 kg. (24,730 lb.). The load was properly distributed with respect to the approved center of gravity limits of the aircraft.

From its departure, the captain filed with Air Route Traffic Control on 3780 meters about 1910 light time to New York International Airport, N. Y., to make it an altitude of 6000 feet, enroute the flight time to right turn and three minutes. This flight plan was approved.

The crew indicated that the aircraft was heard by the end of Runway No. 9, the pre-takeoff check made and the aircraft was started. During the climb and the climb climb, the aircraft appeared to be sluggish but not to an extent to cause concern. At an altitude of approximately 250 feet with the gear up, the crew were told and power was reduced to climb power. Climbing at an indicated air speed of 155 miles per hour, the last action noticed that the engine of No. 3 engine was falling and the all temperature increasing. This condition was immediately pointed out to the captain, who reported that the San Juan tower he advised that they were returning to the airport. Accordingly, at 1213 the flight school the tower of all intentions and the tower replied, "Roger 1204, cleared to land Runway 9, wind one one eight, altimeter two nine nine five. I'll notify you company." The company was notified and some urgent, emergency field equipment was alerted.

Because the oil pressure of No. 3 engine continued to drop rapidly and the oil temperature correspondingly increased, the propeller of this engine was feathered and power was increased to rated power on the remaining three engines. For this time the aircraft altitude was approximately 1100 feet. When power was increased, the No. 4 engine buckled several times, however,

CAB shows referred to hands are Altimeter checked and used on the 11,000-foot

U. S. Navy's new

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the Douglas A3D

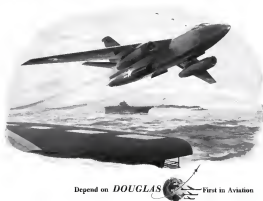
Built for the Navy, and now undergoing tests, the center-based Douglas A3D is designed to add new striking power to the Naval air arm.

Performance data on this plane is still secret, but no secret of its remarkable one—use in service or contemplated for

early service introduction—will be able to carry an equivalent bomb load as high as as fast as the Douglas A3D. Powered by two jets, shown in profile below the wing, the A3D will be in the 600 to 700 mph class ... yet its planned range, from aircraft

carriers, will let it strike across wide expanses of water in enemy territory.

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immediately following these incidents, the engine continued to run as a normal unit. A checking team was initiated to a nearby landing, and the captain said that he had checking conditions for reduced the aircraft's air speed during the time to 140 miles per hour. This reduction in air speed was accomplished by using air brakes. Upon reaching an altitude of about 500 feet, No. 4 engine again flamed out and on rough. Standard procedure was initiated in the engine to approximately 32-35 inches, and upon the engine ran smoothly. Subsequent attempts to operate No. 4 engine at increased power were unsuccessful due to recurrent outflows.

At 1217 the tower asked the flight to proceed to position and advised the captain: "We are still quite a way out." And at 1219, the tower advised the U. S. Coast Guard Rescue Coordination Center at San Juan that the flight was in trouble and gave its position as 20° 25' N, 150° 05' W, 300 degrees from the tower.

The captain probably reduced the air speed to 140 miles per hour, and at that time the heading of the aircraft was changed slightly to the right to maintain a course approximately parallel to the coast line. Because the aircraft was being altitude, engines No. 1 and No. 2 were increased to takeoff power. The second officer was told to the (youngest) complaint to advise the tower and advised that fuel was to be dumped, and all fuel dump valves were then opened. After the second officer returned to the cockpit, the flight advised the tower at 1219, that it would have to ditch, and the captain instructed the second officer to alert the passengers. The second officer returned to the cabin, instructed that a ditching was imminent, took a forward seat on the cabin and fastened his safety belt.

At 1220 on the Pacific C-47 flying in the vicinity notified the San Juan tower that a DC-4 seemed to be ditching and immediately was advised to evacuate the area. Flight 526A continued to circle, and the location of engines Nos. 1 and 2 were advanced to Star steps. With the air speed near 130 miles per hour, the two were lowered to the water. Shortly after that, a landing on the water was made. The landing gear and doors were lowered and the fuel dump valves closed. The second officer obtained a life raft which he carried to the main cabin and launched through a forward emergency exit on the right side. The first officer, after an unsuccessful attempt to launch an other life raft, abandoned the aircraft through a cockpit window. The captain ordered the cabin and alerted passengers in evacuating the aircraft through the main cabin door until he was swept overhead by the action of the air against the door. The aircraft sank approximately three minutes after landing on the water.

At the time of the accident the weather was high broken clouds at 15,000 feet with lower overcast clouds at 1,000 feet, visibility 10 miles and wind from and northeast, 15 miles per hour.

INVESTIGATION

From a large oil slick which was observed on the water following the sinking of the aircraft, it was determined that the ditching occurred at latitude 34° 32' N and longitude 66° 15' W. This is approx-



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usually time and cost half miles off the north coast of Puerto Rico and 11 miles from the airport.

Captain Beta said that when the "prototype" check was accomplished all engines operated normally but that during the test all the aircraft was a little less in altitude. However, the engine manufacturers indicated that they were delivering aircraft power with all present, accessories, and fuel line design including a normal operation.

According to the captain's testimony, from the time No. 3 propeller was loosened and landing on the water, he was either attempting to establish a climb or was flying the aircraft at a non-high altitude in an effort to maintain altitude and air speed and altitude was decreasing throughout the entire process. He stated that because the aircraft was continuing to lose altitude, he changed his original landing, which was toward the airport, to avoid a possible forced landing in a congested area in a sand reef.

He stated that on approach to the water the aircraft was about 100 ft. No. 3 propeller was loosened, and that after a moment from correction he experienced an difficulty in controlling directional control. Throughout the latter portion of the flight, the first officer had the check bar in hand and both he and the captain checked all the instruments and controls in the cockpit during the descent to the aircraft's emergency landing at sea level and altitude. This check also showed all controls positioned properly and engine instruments indicating normal operation for the conditions involved. The captain said, however, that immediately prior to ditching, the fuel flow of the No. 1 and 2 engines appeared to be low. Apparently two moments after the fuel flow valves were opened, the landing was made. The crew said the landing was made tail low and was not considered sufficiently rough to damage the aircraft; however, prior to leaving his seat, the first officer looked out all his windows and saw the aircraft's tail section floating in the water. It was later found that the tail section had broken off behind a bulkhead in the rear of the cabin door. Although heavy rain was raining at the time of the accident, none of the seats were torn from their fastenings.

These 20 rows and one 16 row ribs were carried on board the aircraft as a part of the life-saving gear. These were stored in an open rack to the rear of the cabin's equipment. In addition to the life rafts, a pressure life jacket was available for each passenger. These jackets were located in a pocket on the back of each seat. Above each pocket was a sign in both Spanish and English, describing the location of the pockets.

According to the testimony of the passengers and crew, they were seated in the rear of the aircraft when the forced landing was initiated to the main cabin the second time and by a downward motion of his hands indicated the aircraft was about to ditch. Although they did not hear this crew member say anything, they understood that ditching was imminent, made outside their seat belts were loosened, and donned their life preservers. After the aircraft contacted the water, they shouted to the passengers that the life jackets were located in the backs of the seats, and then proceeded forward,

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opened the two emergency exits on the left side of the cabin, climbed out on the wing and rescued passengers through these exits. The passengers were not told where the jetties were located or instructed to throw away any crew members were in. As the aircraft, considerable confusion occurred. The second officer was able to locate a 20-man exit door in the vicinity of the pilot's compartment and carry it to the rear cabin where he landed it through a forward emergency exit on the right side of the aircraft, through which he also departed. The first officer and a woman passenger tried to leave additional exits, but were unsuccessful, and because of the rapidly rising water was forced to abandon ship, both departing through the right cockpit window.

Immediately following the ditching the captain went to the cabin and ordered the passengers to abandon ship. However, there was very little response. He then asked a passenger to open the rear cabin door, and began frantically encouraging passengers through that exit. While an engine, the door slammed closed, and the captain ripped the handle in an effort to open it again, but as he did so a wave caught the door in its path, pushing it outward, throwing him into the water. Due to the heavy sea, he was unable to return to the aircraft.

Of the 11 passengers who survived, seven escaped the aircraft through emergency cabin exits, five through the main cabin door, and one through the right cockpit window. The first and second officers landed the only life raft launched, and took aboard five surviving passengers, the senior and the youngest. The captain and seven other passengers were picked up by rescue aircraft after floating in the water from 30 minutes to an hour.

When the U. S. Coast Guard Rescue Co-ordinator Center was advised that the aircraft might ditch, they immediately prepared for action. A Coast Guard F4U amphibious aircraft was alerted to respond for search operations, and a few minutes later was dispatched to the scene. The U. S. Coast Guard cutter "Boulder," together with a Navy tug, and other smaller craft, also proceeded to the scene. An additional F4U aircraft was ordered out, at some 20 miles. Its amphibious search of Flight "G" Port Air Rescue Squadron U. S. Air Force from San Diego, Aguadilla, Puerto Rico, the Coast Guard aircraft and two Air Force aircraft landed and reported to the rescue activities. Other aircraft, including the Air Force C-47 which had observed the ditching, ended the area to coordinate the rescue efforts, drop flotation gear, and spot survivors. Searchers recovered and a number of bodies were picked up by the crew of the rescue aircraft and the Bunker. Rescue activities were greatly hampered by the heavy rain. The waves being 10 to 15 feet high. Aircraft in the air spotted a number of bodies in the vicinity of several in sea water, and shook up the wreckage.

On Apr. 13, the day prior to the accident, the aircraft involved was flown from New York International Airport to San Juan by Flight 137, Captain R. E. Adams. The pilot-in-command of this flight stated that after departing the ramp at New York and during the engine run-up, No. 1 engine did not respond properly. At this time it was noted that the left magnets of the engine

was completely dead. The aircraft was returned to the ramp for engine service, after which the engine functioned in a normal manner. During the run-up, no unusual engine noises were heard, and the oil pressure, fuel pressure, and fuel flow, etc., were within operating limits. During the takeoff and climb the aircraft appeared to be normally in every respect and with all engines running smoothly. After being for approximately one hour and 35 minutes, No. 1 engine began running roughly. A short time later the engine failed, and the propeller was feathered. Considerable difficulty was experienced in losing the propeller at this position. Captain Adams further stated that the indicated fuel flow for the three operating engines was below what he expected and he noted the rpm drop in the vicinity of Maximum RPM.

For American World Airways employs a steel conductive, covered magnet steel mechanism and an electrical wire of mechanism to perform all engine maintenance at San Juan. In the event it is necessary to change an engine at this time, it is done upon arrival from Miami.

Upon the accident of Flight 137 at San Juan on Apr. 13, the aircraft was taken to the maintenance hangar for repair, and the flight engineers on No. 1 engine was advised. The last four pages were submitted, and a comparison between the No. 1 engine and the No. 2 engine showed that No. 4 was operating 10-15 pounds less. No error of the discrepancy was noticed on the left-hand As a precautionary measure, the No. 1 engine of main and main was checked. Small metal flakes were found on the screen, and a similar flake was found on the pump plug. These metal flakes were tested by using a magnetized wire filter and were believed to be aluminum. During the run-up of the engine, the mechanism heard a rumbling noise which appeared to come from the main section. The aircraft was then immediately ditched, but the pilot noted that difficulty had been experienced in feathering the propeller on the left hand. As he was going off duty at this time, due to a sudden crew change, he passed this information on to the next assigned staff mechanic relieving him.

The run-up on No. 1 engine for approximately two minutes and because of the unusual noise in the main section stopped the engine. The main section was removed, and additional metal flakes were found in the lower part of the main section housing. Mechanics were engaged to remove and check the same plug and oil screen. A check of this mechanism, which was found in the same. A mechanism then removed and cleaned the oil tank and basket. Examination of the basket revealed the presence of approximately 100 small metal flakes. These flakes were tested by using a magnetized wire filter and were believed to be aluminum. The use of aluminum is standard of this unit to determine the composition of the metal flakes was in accordance with the procedure outlined in the company's Maintenance Manual. The manual describes the method of testing engine oil with acid and the only difficulty in these tests was when the oil was used in when the acid is chemistry. The



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3

IGNITION



It's no great trick to line up an aircraft combustion heater from ground level and to ease of a quick start every time. At high altitude, however, the spark must be "hot" enough to overcome ice particles, frost, and dirt accumulation on spots of corrosion.

Since problems of this nature seldom have ready-made answers, Jantrol engineers have for a long time developed their own opinion systems to ensure unfailing operation under all operating conditions.

The job calls for a cost combination of gap distance, voltage, and their application to specific boxer requirements to ensure dependable ignition, and, to minimize wear on spark plugs. Ignition systems are constantly under development and test to achieve greater savings in weight and compactness.



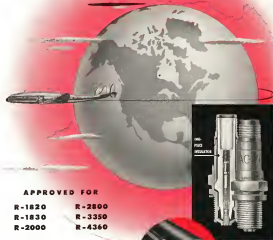
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Two engine dead was not dissatisfying, however, it was given a money reimbursement and a certificate stating that a bearing was damaged. Also, \$100 of credit was issued to the bottom of the new engine. A mechanic placed his finger through the opening to check the bearing, and the engine was found to be good. The bearing was called to the attention of the mechanic. The chief mechanic was not so sure when the work was done, however, said the mechanic that someone checked the unit for oil, and the report, the chief could have been mistaken, even he was subject to call at all times. The mechanic that worked did not consider the cause of either necessary and according to company policy sent the following message to the company's main office.

"FORMER MIPMA CORP. NUBER #3 ENGINE FLIGHT STAGE 4 DUE TOUGH RIGHT MAGNETO STOP SEND FOUND ALUMINUM SPRAYING ON SPARK STOP FLIGHT ENGINE CHANGED OIL CHANGED RIGHT MAG STOP ON 8/17 FOUND BAD NUBER ON NUBER SECTION STOP FRICTION CHANGING NUBER SECTION STOP WILAD AFTER 1/4 MAG 13999"

In effect, this message means that he was changing the right magnet, that he had found aluminum filings in the spark and oil areas, and that he was checking the engine and changing the oil, also, because of a new the new section was being changed. There did not acknowledge receipt of this message or sent the instructions. According to the testimony of the mechanic, none of the work listed above, he considered that he had approved to proceed as stated.

The company's Maintenance Manual specifically states that when foreign material, such as aluminum, is found in the spark, etc., the following action of procedure is to be followed: "The entire oil system, including all tank oil, including oil temperature regulator and oil pump, must be thoroughly cleaned and flushed, or replaced, including the necessary section above. Put about 10 gallons of oil in the tank and run the engine for about one-half hour, bringing it up to take-off power once for the aircraft only during this period. Drain oil, clean the engine cover and fill oil tank to proper level. Run up engine again, pull cover and change plug, also the main section located between the oil pump and vacuum pump on the accessory section. If all right, release the flight."

When the new section was changed, the above procedure was not followed, in that the specified engine run-up with only 10 gallons of oil in the tank was omitted. The purpose of this run-up with 10 gallons of oil is to accomplish a more efficient burning of the engine's oil pump, thereby depositing any additional metal debris in the oil to be drained or in the oil pump plug and screen. By eliminating this part of the prescribed procedure the additional debris was not removed, and a necessary essential hour of engine run-up time was lost. In fact, oil was placed in the tank to the



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fall level, and the engine was then run up for a few minutes and exposed to further stresses. The oil pump plug and unit were then checked, and there no sign of metal was found, the engine was released to service.

Subsequent to the accident, the new section which had been removed was disassembled and examined by the Board's investigation, and cutting parts were removed and forwarded to the Washington office for further examination and study. The examination revealed that the reduction drive gear housing had partially failed. Failure of this bearing allowed the reduction drive gear teeth to move partially out of mesh. This forced operation in this condition would eventually result in complete failure of the reduction gear assembly.

The oil supply came from the No. 3 engine propeller reduction gearing was forwarded to Washington, where the contents of these cups was given a spectrographic examination at the U. S. Bureau of Standards. This examination showed that metal particles were increased in the upper 1/16-inch layer of the shingle, and where these metal particles were separated, it was found that the major constituents were copper, sodium, chromium, vanadium, nickel and lead. With the exception of the lead, which is an undetectable amount of the fuel that does not burn, all constituents were outside metal in the manufacture of the engine. The remainder of the shingle below the 1/16-inch layer had lead in its major metallic constituent.

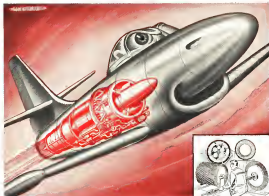
As the aircraft was departing the camp, the log was placed aboard, which was the first time that information was available to the crew that the new section of No. 3 engine had been replaced, however, none of the crew checked the log before flight.

The Little America Division of Pan American World Airways maintains a flight and ground training school at its Miami Base. All flight training is taught by personnel instructors. These instructors do not have direct contact with pilot trainees and do not fly by the line.

Captain Barr was employed by Pan American World Airways as a co-pilot on Sept. 9, 1942, and checked out as co-pilot on DC-4 aircraft June 27, 1946. In the fall of 1950 he was trained for 51 hours as the ground tower and received several hours' training in a Boeing 377 aircraft, following which he served as a co-pilot on that type aircraft for a period of approximately one year. In January of 1952, Captain Barr completed his ground school training and 15 hours of flight training on DC-4 equipment. This was given at instruction training bases as pilot in captain.

On Jan. 9, 1952, upon completion of his instruction training, Captain Barr was recommended by his instructors for assignment and type rating checks on DC-4 aircraft. As a result, on this date Captain Barr was given both an oral examination and a flight test in the Clark Field instructor, who, before he started additional time, flew with him on the two following days, after which he was given the necessary ratings. Captain Barr had three opportunities to fly as a pilot on a DC-4 aircraft prior to the accident.

A review of the aircraft's records indicated



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Just prior to departing this flight, the engine had the following total time over last overhaul: No. 1, 2 and 4 engines, 1250.34, and No. 3 engine, 1125.11. In the Maintenance Log, under "flight entries," were several comments which indicated that the aircraft was capable in climbing. In each instance, the aircraft was below the climb-the-gust height. Other comments reflected fuel flow below normal and available engine trouble. The log, under "Maintenance and Service," indicated that the fuel flow from was "continued to Manual."

ANALYSIS

Only a minor trim correction for yaw was required from the time the propeller was installed on No. 3 engine until the aircraft was ditched. This was true despite the fact that during certain portions of the flight takeoff and maximum power were used on Engines No. 1 and 2. During these power settings, No. 4 engine was set at 12.15 inches of mercury. From this it can be seen that the No. 4 engine was producing considerable power, otherwise, there would have been a decided yawing moment when power was increased on engines 1 and 2. It has been established by flight test that the DC-4 aircraft loaded as a like aircraft will maintain level flight, and climb slowly, with only two engines operating at a maximum continuous power with the propellers of the remaining two engines feathered. Therefore, the aircraft, under the conditions described, should have at least maintained altitude.

Referring to the Performance Chart in DC-4 CAA Approved Flight Manual, it is noted that with altitude and temperature etc., associated to the conditions surrounding this accident, and with two engines operating at maximum continuous power, propellers of the remaining two engines feathered, the aircraft will climb at the rate of approximately 15 feet per minute. Also with three engines operating at maximum continuous power and the fourth engine's propeller feathered, the aircraft will climb at approximately 400 feet per minute.

Engines which have considerable time in service may suffer a loss in power. All of the engines involved had approximately 1200 hours of service time recorded. As the engines were not equipped with torque meters, it was impossible to determine exactly what their actual power output was on this flight. However, even assuming that there was a loss of power due to wear in service, it is difficult to understand how the sustained power of the three engines operating in ditch could be less than that from two good engines operating at maximum continuous power.

Throughout the flight and the subsequent ditching, the cabin stated he followed the powered procedure reflected in the company's Operation and Flight Manual. He said that, after feathering the No. 3 propeller, he established an altitude of 145 miles per hour throughout the climb but after experiencing difficulty with No. 4 engine he then established an altitude of 135 miles per hour as an effort to climb at the maximum rate. Although the company's Flight Manual states that there is no need to correct for nitrogen and nitrogen operations, respectively, this applies to air

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AIR TRANSPORT

Five-Fold Air Cargo Gain Seen by 1959

- Lockheed study coincides with Douglas conclusions.
- Findings based on past trends, new equipment.

By Lee Moore

Air cargo volume will increase five fold by 1959 and surpass passenger volume, it will give the airlines 17% of their total revenue, compared with today's 28% including mail subsidy. So says a new Lockheed Aircraft Co. study forecast which is called "Air Cargo Trends."

The forecast reaches the same conclusions as a similar study by Douglas Aircraft Co. early this summer (AIAA News Week Jan. 30, p. 57), although the forecasting methods used are different.

Other findings of the Lockheed report, released today after 15 months research by Lockheed cargo engineers L. B. Blackney and Charles J. Kersch. • Higher profit potential per dollar of investment than passenger business. The cargo plane can carry 55% of its cost in one year, compared to 40% for a passenger plane. Lockheed reports Boeing higher load factor, less personnel attention required.

• 15 billion ton-miles a year by 1960—a volume equal to dispatch of almost 10,000 railroad freight cars across the U. S. per day for a year.

• New 1049Rs and DC-6As are the key to making good on this potential, Lockheed says. A fleet of new Douglas DC-6As and ten Lockheed 1049Rs could carry 235,416,000 ton-miles a year, which is more than the domestic railway total last year. Lockheed estimates. The Super Constellation 1049's capacity is 45% greater than its modern Douglas equivalent, the DC-6A, Lockheed claims.

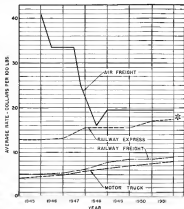
• Growth trend in the market will spread up later in the decade as airlines modernize flight and ground cargo equipment, replacing old planes with 1049s and DC-6As. (Chart 2)

• Expansion of air land, the outgrowth market will expand above its potential, Lockheed says. One reason is that it is not the air alone that counts, but its relation to the rising cost of competitive surface transport. (Chart 1) Air freight grows automatically with the industry trend to lighter inventory

Lockheed Comparison of Cargo Plane Capacities

	Payload (lb.)	Block Speed (mph)	Ton Miles (5-hr. day)
Constellation C-46	12,160	150	3,000
Douglas DC-4	22,000	200	16,800
Douglas DC-6A	25,400	285	12,170
Lockheed 1049R	36,100	305	47,000

Source: "Air Cargo Trends" study by Lockheed Aircraft Co.



* NEW EQUIPMENT OF AIR/TRADE
NOT REFLECTED IN RATE

CHART 1. Rate comparison, stored back for 100% shipments, Baltimore-New York.

control, gentler delivery, and customer acceptance as a means to cut down material shortages, curing requirements, damage in shipment and effect of plant shutdowns.

• An expense and need will increase in

a steady trend. Express and mail, together with freight, make up the overall "cargo" category.

• Air freight continues prediction by Lockheed "will depend to a large extent on the plan of action followed by the

to upright position without pinching the "inline button."

Forward and rear seat bases are large diameter 305T drill tubes. The side rail structure is a welded assembly of one-inch 515T tubing riveted to the forward and rear tubular transverse bases.

The outboard structure is designed to conform to the contour of the air pilot. The semi-welded closed box structure of 515T alloy sheet metal provides flexibility for attachment of the seat to the side of the fuselage. Seat structure is divided into halves by a tubular spreader bar also of 515T material.

It stabilizes the forward and aft

bases and provides sockets for the center seat rail.

Cushion for seat back and seat are of adiabatic heat in anelastic rubber. Seat-bottom cushions are supported by lightweight nylon cloth leaf springs between forward and rear bases. Resilience of the nylon cloth and of the cushions makes additional springs unnecessary.

Seat backs are of simple tongue bar design made of lightweight 5052 2484 sheet alloy.

The telescoping seat backs need

provide an infinite number of locking positions for the reclining locks.

Four attach points are provided for the rear 340 seat, two on the side of

the fuselage and two on the floor at the side rails. Either bolt type studs or quick-release studs may be specified by the purchaser.

• **Cord Analysis.** This Northrup Analysis cord of a Corsair 340 in Peabody Bay, near Los Angeles (N.Y.) report, Jan. 14, 1952, presented an unusual case for study of the puncture qualities of properly designed seat backs equipped with the modern safety belt members designed to withstand 3,000-lb. loads combined with the inevitable consequences of a strong, powered transport landing.

Analysis showed that the airplane ditched in 15 ft. of water during maneuvers military conditions while making a normal approach at about 135 mph at a normal rate of descent of about 500 ft. per sec. The right wheel touched the water first, pivoting the airplane to the right. Then the main gear, left main wheel and wing struck the water. Impact tore off the leading edge, left wing and left engine nacelle. Right wing in three sec. disintegrated and dove into the sea.

• **No Passengers Killed.**—All 51 passengers and crew of three escaped unhurt or with injuries regarded as minor, with three exceptions. One had a fractured hand, another a contusion of the knee and the third a slight injury to the kidney attributed to the twisted position in which the passenger was thrown when the plane hit. Pilot and co-pilot immediately struck their heads against the glass shield in the cockpit without severe injury. The stewardess, in the "swivel" seat bolted aft in the cabin, was unharmed.

Advantage of the special Corsair seat back design is indicated by the fact that backs of six seats were struck hard enough to cause permanent deformation of the structure, presumably by the heads of passengers sitting in back three. It is probable that other seat backs acted as metallic cushions for other passengers' heads without causing plastic deformation of structure or head injuries.

• **G-loads.**—Calculations are that the belt and wings absorbed peak loads in the range of 10 to 15G in the impact Corsair Injun. Research investigator A. Howard Gibson, crashed the crash wreckage, and the photographs he took indicated that seat and seat attachments act and may have exceeded prescribed GAA design load requirements at 5G forward, 6.6G downward, and 1.5G sideways. Failure of some seat attachments indicates that their loads were exceeded. Although the mean force of deceleration from first impact until the plane stopped did not exceed 2 to 3G.

Approximately 65% of the seats in the forward cabin and 40% of the seats in the aft cabin of the aircraft were damaged. Only one-third of the seats

the fuselage and two on the floor at the side rails. Either bolt type studs or quick-release studs may be specified by the purchaser.

Analysis showed that the airplane ditched in 15 ft. of water during maneuvers military conditions while making a normal approach at about 135 mph at a normal rate of descent of about 500 ft. per sec. The right wheel touched the water first, pivoting the airplane to the right. Then the main gear, left main wheel and wing struck the water. Impact tore off the leading edge, left wing and left engine nacelle. Right wing in three sec. disintegrated and dove into the sea.

No Passengers Killed.—All 51 passengers and crew of three escaped unhurt or with injuries regarded as minor, with three exceptions. One had a fractured hand, another a contusion of the knee and the third a slight injury to the kidney attributed to the twisted position in which the passenger was thrown when the plane hit. Pilot and co-pilot immediately struck their heads against the glass shield in the cockpit without severe injury. The stewardess, in the "swivel" seat bolted aft in the cabin, was unharmed.

Advantage of the special Corsair seat back design is indicated by the fact that backs of six seats were struck hard enough to cause permanent deformation of the structure, presumably by the heads of passengers sitting in back three. It is probable that other seat backs acted as metallic cushions for other passengers' heads without causing plastic deformation of structure or head injuries.

G-loads.—Calculations are that the belt and wings absorbed peak loads in the range of 10 to 15G in the impact Corsair Injun. Research investigator A. Howard Gibson, crashed the crash wreckage, and the photographs he took indicated that seat and seat attachments act and may have exceeded prescribed GAA design load requirements at 5G forward, 6.6G downward, and 1.5G sideways. Failure of some seat attachments indicates that their loads were exceeded. Although the mean force of deceleration from first impact until the plane stopped did not exceed 2 to 3G.

Approximately 65% of the seats in the forward cabin and 40% of the seats in the aft cabin of the aircraft were damaged. Only one-third of the seats

The new Corsair 340 seat, a development of the 240 seat designed by G. K. Sherman, Corsair senior design engineer, is built to withstand design loads at 5G forward, 5.5G downward, 10G upward, and 1G side load, and is considered by General as one of the most advanced seat structures now in use.

• **Future Trend.**—Study of the Northrop 340 seats indicates a future design trend to even sturdier structures than the 340 seat. The trend is expected to be felt in smaller aircraft and business aircraft as well. One new two-place design, Paul Otto Koppner's Helicopter, is being designed with seats which will take 150 loads fore and aft.

Expectations are that the modern powered transport will be capable of taking crash impact loads perhaps in the neighborhood of 10G, with relatively slight damage. If this is true, designers of aircraft cabin structure are not going to find advantage of their basic systems, where they design seats which would fail at perhaps one-third of the load that the full will take.

Hatbrook and Hugh De Haven, director of Civil Injury Research, think that the new philosophical safety record at the Northrop 340 crash at New York virtually can be traced in a large percentage of an transport accidents of the future if the airline operators limit on a few well-defined design principles.

- Design seat backs of durable metal structure that will cushion the shock of head or body contact without serious injury.
- Design seat backs to fold forward to provide further "give" at initial impact.
- Anchor seats firmly to primary structure of the airplane, so passengers will "stay put" under relatively high G forces.
- Anchor passengers firmly to their seats with tough lightweight 3,000-lb.-load seat belts now required by Civil Air Regulations.

Braniff Asks Higher Domestic Mail Rate

Braniff Airways has asked Civil Aeronautics Board to set a higher temporary domestic mail rate than the 51 cents a pound proposed by CAA. Revenue in Braniff's merger with Mid-Century, which was still a scheduled carrier. The Board argued that elimination gained by the merger should make the merged company able to get along on the unprofitable 51-cent rate. Hence the rate is only temporary. CAA has plenty of time to consider Braniff's plan. Post Office department demanded a full hearing on the Braniff's



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original proposal of a permanent 50-odd year for Remitt. First Office, absorption of Remitt's ability to make good on that rate, said CAA to require the day has to be up to "average population" of the Board set a permanent rate as low as 15 cents a tonne. Then deliver him led CAA to propose the temporary rate as the interim while the "regulation reserve" is debated.

Nonused Licensed

Canadian Air Transport Board has licensed Rochester Aeronautical Corp. to provide charter services from within 50 mi. of its Rochester, N. Y., base to any point in Ontario, Canada's Atlantic Coast provinces and Newfoundland, south of 52 deg. latitude. The owner is restricted to using planes having a maximum weight not exceeding 6,000 lb. The service may not deliver traffic between Canadian points.

SHORTLINES

✦ Air France will get 35 new planes next year, including Super Caravelles, Visions Visentins, the French Baguettes, and Brest's jet Comet.

✦ Air Transport Assn. decides Dec. 9 whether to adopt a newly simple survey of traffic origin and distribution, now proven practical by ATA itself. The data used to be collected twice annually and published two years later.

✦ American Airlines' weekly volume topped 51 million in October with more than 6 million tons miles covered in ordinary schedule which AA says it hopes to surpass again in December.

✦ Australian National Airways will get a government loan to buy second-hand planes in striking areas.

✦ Royal International Airways' non-monthly international passenger sales gained 33% over a year ago. Company has applied, along with United and Constellation, for one-plane through service between Pacific Northwest to Korea, Japan, India and Java via airbridge at Denver, starting with TWA, DC-6 and adding Boeing and Continental DC-6 later.

✦ British European Airways' products 46-64 passengers' capacity 160 mph. by 1960, but actually is needed to develop two prototypes, costing \$1 million, says Chief Executive Peter Mearfield.

✦ British Overseas Airways' combined trans-Atlantic passenger traffic gained

49% and freight 20% April-September over a year ago. Company will cut its winter service in half, although TWA and Pan American are cutting only slightly.

✦ Coastal Airlines' October traffic hit an all-time high of 5,006 passengers, with record load factor of 28%, showing that some loads will have a long way to go for all efficiency.

✦ Chicago & Southern Airline with TWA for the New York-Richmond, Memphis-Houston service will get CAA approval. It will cut capacity with TWA's direct New York-Houston monopoly route.

✦ Civil Aeronautics Board plans prohibiting continuance in its "general line" aircraft" as a low weight. Since the previous conference, the airlines with slow their plan to drop secondary aircrafts. Many airlines now are planned low level and operating of typical carriers with increasing distance. CAA will wait several weeks at least before applying G. Bernard Stinson, chief of Routes and Carrier Allocation division. He is giving Pan American in doctrine of economic planning. CAA has approved scheduled and booked military business contracts for monthly new Navajoes, prevented by United from increasing civilian business, now are concentrating on the scheduled military contract business.

✦ International Civil Aviation Organization has set limits on the number of aircrafts needed for an extensive and broad in international travel, as important as the 1953 trend to not red tape increasing travel. Visa, transit permit and currency restriction on the shelf now. New rule also helps permit and required business, set covering in the 1953 agreement.

✦ Pacific Northern Airlines last year of United States Alaska route, ended Sept. 10 totaled 18,335 passengers, 1,252,600 ton-miles cargo and 246,473 ton-miles in total. TWA PNA traffic that year on all routes a up 68% for passengers, 125% for cargo and 178% and compared with a year ago.

✦ Pan American World Airways' direct service to Hong Kong Dec. 1. Company has made its 46,000-ton, 46,000-ton, will operate 25 annual trips a week this winter, more than twice a year ago. Summer traffic was 70% heavier than a year ago.

✦ Pioneer Air Lines' October traffic of 18,103 passengers was 37% over a year ago and was an all-time record. Company flying 16-passenger Martin 2-9-2, averaged 151 passengers per

month flown, compared with 104 two years ago.

✦ Trans World Airlines is expected by CAA to ask a "transatlantic-world route" in the "Piedmont Atlantic, at all times. Pacific conditions prevail only," per-licensing conference on which was slated for last week. Company's Boulder-Tulsa service flight returning to U.S. across the Pacific this month is a status.

✦ Company plans 26 trans-Atlantic roundtrips a week this winter, compared with Pan American's 28.

✦ United Air Lines reportedly has an

agreement with a dual Impacter applicant for from Pacific coast-to-line Shipping Company, which would fly Tokyo-Honolulu, starting October 1954. One-way service passenger rates at 225,250,000 were up 30% over a year ago although down 4% from September. Company has a steady demand for light engines at cost-level pay.

✦ Wisconsin Central has a CAA show-case order for temporary rail pair of 5700,164 tons Mar. 1 to Aug. 1 this year, equal to 514 tons a plane mile. New passenger tonnage rate is 67 cents.

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From this table the fact stands out that progress in raising our level of prosperity has been halting. What progress we have made came in a few dramatic increases before or after a military buildup. Aside from those, the progress has been fairly slow. This year, 1952, it has been particularly discouraging.

Again, when account is taken of the number of people who must share in the goods and services that are available, our progress is even less marked. This is shown by the following table which gives the share of the average American in the national product. This, as the table indicates, is arrived at simply by dividing the total of available goods and services by the population on hand to share in them.

YEAR	POPULATION Millions	ADJUSTED NATIONAL PRODUCT 1951 Dollars	ADJUSTED NATIONAL PRODUCT Per Person
1940	132.0	\$176.3	\$1.325
1946	141.3	222.5	1.575
1947	144.0	380.7	2.643
1948	146.6	344.5	2.349
1949	149.2	339.7	2.276
1950	150.6	360.9	2.396
1951	154.4	367.9	2.382
1952	155.9	364.3	2.335

Here it is clear that we have made little or no headway since the end of World War II.

U.S. Compared to Other Nations

Although we are making slow progress in increasing our prosperity, as measured during recent years by the amount of goods per person, we still are by long odds the most prosperous people on earth. This can be seen from the following table. It offers a rough measure of how the adjusted output of goods and services per person in the United States compares in 1951 with that in a number of other countries:

COUNTRY	PER PERSON
United States	\$1,735
Canada	1,291
United Kingdom	634
France	599

To figure more closely "How Prosperous is the U.S.A.?" we must answer a number of

other questions. One of the most important will be the subject of a later editorial in this series. It is "Who Gets What?" How have various income classes and occupational groups shared the total available goods?

Another question that has a close bearing on the quality and durability of our prosperity is "How fast are we using up irreplaceable natural resources, such as oil, iron ore, and copper, to sustain it?" Any attempt to deal with this very complicated question must also be deferred.

A Problem for the Future

In the meantime, however, key facts about our prosperity are that:

1 Most of the increase in the nation's total production in recent years has been to meet military requirements rather than to improve the American standard of living.

2 The increase in the supply of goods and services actually available for the average American has been slow and halting.

3 We Americans are still extremely well provided with the good material things of life, as compared with peoples in other lands.

These three facts bring to mind a whole series of policy questions. What can be done to speed up progress in improving our prosperity? What—to repeat the question discussed in the previous editorial in this series—can be done to make our prosperity less precarious?

Here, however, the purpose is not to prescribe. It is simply to indicate as accurately as it can be done in a brief article the actual state of the nation's prosperity.

In doing this much, it can properly be remarked that the record presents to the American economy both a problem and an opportunity of surpassing importance. It is that of building a prosperity that will be both more progressive and more secure than any we have known in recent years. In the light of what clearly remains to be done, we shall make a grave mistake if we use up any of our energy in congratulating ourselves on the relatively meager progress here recorded.

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AVIATION WEEK, November 24, 1952

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LETTERS

Dubious Data?

You editorial, "The Reverend Prop Concocting," on Oct. 27, presenting the report thoroughly, brings forth data that seem to be in some degree but perhaps not in gross degree the work of CIA research.

You detailed how some people are receiving materials reported under Title's article approval. What much is not the CIA's role in all this?

"Monitors, No. 1 says American DC-8s should be pulled back through the defense stop, but the prop did not seem because it was not pulled back far enough to activate several. Cases of trouble being too to come back through stop lines that the aid.

Did not the way we found it? According to our information about the incident, which we have reason to believe is authentic and accurate. No. 4 prop malfunctioned on No. 1 and contrary to the assertion that there was no reversal, the prop reversed partially just before touchdown with such a pronounced reflecting effect on the plane, perceptible to the people as it, that a rough and nervous landing resulted.

A checkup with the crew at the place—American Flight 151 out of Mexico City, Sept. 25—said with the mechanics who were in it, and the management who stayed the report and the CIA after which we could a should certainly be made to find out where along the line the truth got lost. Perhaps the CIA should be the agency to open an investigation of CIA's activities operating procedures.

Has official report can turn the American Monitors looking into a flight mechanical Monitors have more often seen have been accompanied? And how many such times go unreported entirely?

Monitors safety program can be left on defense data.

KIM W. PIERCE, Editor
Time, The New York Magazine
67 West 44th Street
New York 36, N.Y.

(American Wire has also detailed. We just sent both CIA reports on the Monitors incident. The first report said the time on No. 1 propeller. It fails to say whether the propeller actually reversed. Plans tell us that the reversing process is several seconds in duration. During these several seconds before coming to a complete stop is a most perilous time in which it was said the prop does or does not stop to reverse. Monitors Wire has based its comment of the plane who reports that the stop was successful in Mr. Pugh's report, and that the landing was unproblematic. Pugh also refers to this out of perfect records as reported by CIA.)

It is not clear that the reversing process is several seconds in duration. During these several seconds before coming to a complete stop is a most perilous time in which it was said the prop does or does not stop to reverse. Monitors Wire has based its comment of the plane who reports that the stop was successful in Mr. Pugh's report, and that the landing was unproblematic. Pugh also refers to this out of perfect records as reported by CIA.)

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Such Economy!

In AMERICAN WIRE'S recent issue Sen. John's double page advertisement shows

Eastern's Consolidation in flight and states Eastern's presence of the four products available when the incident on the plane appears to have been reported in the full national position. Such advertisement that itself will for stability and economy look necessary!

We will assume that the "Consolidation" was on a training flight—but this is not relevant to any price choice of pattern for such shortening program.

WALTER A. JONES
3141 North-High School Road
Indianapolis 44, Ind.

From de Havilland

A word of appreciation of our article Sept. 13, "D-110 110 Shook of a F-104's Evidence." This is indeed a lot of work to complete and needs to be a quality account around of our buildup of jet fighter experience and I find it very satisfying.

AL JONES
The De Havilland Canada Co. Ltd.
Burlington, Ontario
Canada

LA's S-55

We all feel that S-55's Causality story about our S-55 program was completely well presented. In fact, it was so good that I wanted a thought to come to find out for the first time just how many things we have done in this from your article.

C. M. BROWN, President
Los Angeles Aircraft, Inc.
Box 10211 Airport Station
Los Angeles 45, Calif.

Praise

Congratulations on your handling of the article "Landed Like 'Chutes of D-110s'." In the Oct. 6 issue of AMERICAN WIRE. We in the Professional Test Department at Lockheed are proud of the editing and the manner in which it was done.

Please advise if you have the article in your file. We have many requests from departments, personnel for copies.

DAVID D. KOSTER,
Propulsion Manager
Professional Test Department
Lockheed Aircraft Corporation
Burbank, Calif.

We would like to ask permission to reproduce in our issue Sept. 29 issue, "A-1000's Weight at Northrop." We wish to reproduce it for distribution in our expanding training program for aircraft head designers with no previous experience. We feel that the information contained in this article would be of extreme value to them.

F. B. COY
Engineering Personnel Liaison
Pacifi-Helicopter Corp.
Morton, Pa.

Shelvin & Pulse-Jets

Admiral Helicopters and the Army do some considerable work in the development of the pulse jet helicopter field which you reported Oct. 13. Certain important factors, however, which are not in accordance with facts.

It is noted that "When Air Force dropped Helicopters, the Army said 'I go up.' What Army did with it last year being followed by American Helicopters."

This comment with its definite American Co. has been continuously engaged in pulse jet engine research, development and production since 1941. This work has been carried out largely through private enterprise, but also with assistance of Navy, Air Force, and Army contracts. As a result, we have the largest and most successful experience with pulsejet engines of any firm in existence.

In this regard, we have been producing pulsejet engines continuously for years. Our pulse jet engines and pulse jet devices are in successful use all over the world. Further, it is believed that ordinary consumers for our pulse jet engines and devices are considerably greater than the those of any other firm.

Among other statements which imply serious distortion, we wish to refer to the following: "About two hours life of the pulsejet engine was one of the major obstacles to development of American aircraft for this kind. Life is now up to 10 hours."

As a matter of record, we have since time ago conducted life tests of our pulse jet engines which indicate an initial value rather than in excess of 400 hours. Some of our commercial devices which have been in the market for years exhibit a value endurance greater than 75 hours.

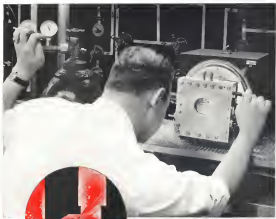
We certainly believe that American Helicopters and the Army deserve a great deal of credit for the accomplishments which you report in the helicopter field, but also feel that credit should be given where credit is due.

Pulsejet engines for long being developed by the Air Force and being tested by the efforts of the Army and American Helicopters, have been the sole basis of our firm for a good many years. Further, much of the development work has been possible as a result of work as called by American Helicopters and issued out for our test long ago.

Private usage of pulsejet engines should be no cause for criticism to American Helicopters and the Army, when our pulse jets have been a commercial unit for very long and are believed to be in greater military use than that by any other pulse jet.

We have no desire to detract from what has been the accomplishments of American Helicopters Co. and the Army in the helicopter field, but do feel that some credit based statements have been made which are patently against the leading role in the pulse jet field which has been and still is played by our firm.

W. L. TERRY
Shelvin Manufacturing Co.
Venturia, Ohio





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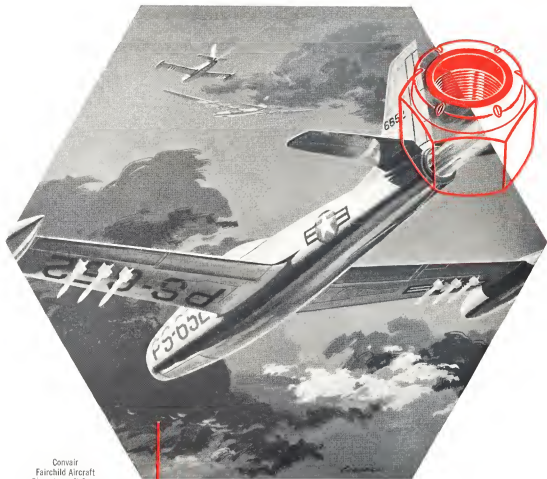
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